

ANNUAL REPORT

OF THE

Mass.
HARBOR AND LAND COMMISSIONERS

FOR THE YEAR 1890.

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Commonwealth of Massachusetts.

HARBOR AND LAND COMMISSIONERS' REPORT.

To the Honorable the Senate and the House of Representatives of the Commonwealth of Massachusetts.

The Board of Harbor and Land Commissioners, in accordance with the provisions of law, respectfully submits its Annual Report for the year 1890.

SOUTH BOSTON FLATS.

The work of filling and improving the tide-water lands of the Commonwealth at South Boston has been continued without material change in the plan or methods of operation.

The 100-acre lot, all of which is inclosed and filled, and on a portion of which the streets have been graded with gravel, is in substantially the same condition as at the date of the last report. The sewers and other improvements are in good order. There have been sold from this lot the past year 21,421.5 square feet of land, lying between Congress and Fargo streets, for \$10,710.75. Several parcels on the northerly or water front, 28,500 square feet in all, have been leased on such terms as not to interfere with any permanent disposition of the territory which it may be desirable to make hereafter. The license which was given to the city of Boston two years ago for the temporary use of about 15 acres of this lot for a play ground, has been extended, on the same conditions, to cover the year ending December 31, 1891.

Progress of the Work.

The work of the last year has been mainly expended on the 75-acre lot, which adjoins the 100-acre lot on the east. This lot had been inclosed the previous year on its northerly and easterly sides by a bulkhead. The sea-wall on the side toward the reserved channel, which was in process of building at the date of the last report, under a contract with Mr. Charles H. Edwards, was completed and the work accepted early in July last. This wall, 1,828 feet in finished length, now extends easterly to a point about 80 feet beyond the line of Congress Street as located across the reserved channel; and completes the inclosure of the 75-acre lot, with the exception of temporary gaps left in the easterly line of bulkhead for the passage of dump-scows. The sea-wall will serve also as an abutment for the bridge by which Congress Street will cross the reserved channel.

Upon the completion of the sea-wall in July, the Eastern Dredging Company deposited along its front about 6,000 cubic yards of clay dredged at East Boston, at a cost of 22 cents per yard. This was done to cover and strengthen the foundation of the wall, and to protect the timber in the foundation from the attacks of worms. In August, the New England Dredging Company was employed to dredge out a trench in the rear of the sea-wall, at a distance of about 40 feet so as not to disturb the stone ballast, and to place the material taken from the trench against the back of the wall. This method of filling immediately behind the wall was adopted as likely to cause the least outward pressure against the wall. The trench was afterwards re-filled by dumping from scows other material dredged from the reserved channel.

A contract, the terms of which were stated in the last report, was made with the New England Dredging Company in April, 1889, to receive, elevate and deposit on the 75-acre lot all suitable material which should be offered by parties engaged in dredging in other parts of the harbor. There have been deposited under this contract the last year about 75,000 cubic yards of such material, equivalent

to nearly five acres of filled land, and making, with the work of the previous year, about 18 acres filled under this contract to date. All of this material has been deposited on or near the line of Congress Street extended to the reserved channel. Less than the usual quantity has been offered and handled under this contract the last year, owing to the comparatively small amount of miscellaneous dredging which has been done in the harbor, either by the general government or by private parties, excepting that done by parties who were using the material for filling their own lands. The funds provided for government work by the river and harbor act of 1888 had been exhausted, and the act of 1890 was passed too late in the year for operations to begin the past season. A larger supply of such material is expected the present year.

In addition to the filling under the above contract, nearly 14,000 cart-loads of ashes and other refuse have been deposited on the 75-acre lot by the department of sanitary police of the city of Boston, and over 20,000 cubic yards of earth and waste material, from excavations for buildings and the like, by various other parties. The cost of the former material has been reduced the past year from 12½ to 6 cents per load; and the latter is supplied without any cost except the wages of a man to superintend the dumping.

Reserved Channel.

In 1889, a channel 60 feet wide and 12 feet deep at mean low water was dredged from the head of the reserved channel to Lawley's yacht yard, and thence 65 feet wide and 8 feet deep to the main ship channel, — as more fully described in the last report. This channel was found to be too narrow for safe and convenient use. In September last, a contract* was made with the New England Dredging Company, the lowest bidder, to widen both sections of the channel 50 feet, so that they should have a width of 110 and 115 feet respectively, with the same depths as before. The material taken from the channel has been used for filling the 75-acre lot. The work of

* See Appendix, C.

widening will be finished the present month. The channel will then probably answer the needs of navigation for some years to come, or until the whole improvement is further advanced.

Congress Street.

In view of the importance of Congress Street, as being the most direct and convenient public avenue by which access is had to the Commonwealth's land, and, when finished, by far the shortest and best thoroughfare for business and travel between the centre of the city and South Boston, much of the work of the last year has been directed to its early completion.

Congress Street extends across the territory of the Commonwealth from B Street easterly to the reserved channel, a distance of more than half a mile, with a width of 75 feet. All the material required to complete the filling of the land under and adjacent to the street, to the line of the sea-wall on the reserved channel, is now in place; and that portion of the street which is not already graded, will be ready for the gravel the coming spring. It is expected that the graveling will be finished during the next working season.

The city of Boston is just now making a contract for the further extension of L Street towards the line of the reserved channel on the South Boston side. The city engineer is considering the plans for a bridge across the channel to connect this street with Congress Street; and the mayor has been empowered by the city council to apply to the legislature at its present session for authority to raise the funds for its construction. All these facts point to the conclusion that the opening of this important avenue across the property of the Commonwealth will not be long delayed. In the meantime, some effectual remedy must and doubtless will be found for the dangerous and unwarranted obstruction of Congress Street by the seven freight tracks of the New York and New England Railroad Company which now cross it at grade.

Provision for Continuing the Work.

The balance in the "Commonwealth's Flats Improvement Fund" on the first day of January, 1890, available for carrying on the work, was \$4,247.23; to which there has been added during the year \$3,104.54 income of the fund, \$10,850.79 rents of land and proceeds of land sold, and \$127,000 paid into the fund from the treasury of the Commonwealth under the provisions of chapter 93 of the Acts of 1889 and chapter 12 of the Acts of 1890; making a total of \$145,202.56 available for the work. Of this sum there has been expended during the year \$44,507.70, leaving an available balance, January 1, 1891, of \$100,694.86. In order to provide for the work now in progress and in contemplation, it is estimated that it will be necessary to provide for the payment of \$20,000 into the fund the present year.

CHARLES RIVER.

The order of the Secretary of War for the alteration of the four lower highway bridges across Charles River, which was served on the cities of Boston and Cambridge in December, 1888, has not resulted in the making of any changes in these bridges, at least for the present.

At the date of the last report, application had been made in behalf of the cities to the present Secretary of War to revoke the order; and the bridges in question had been referred by his direction to a board of engineers for consideration. This board made an interesting and exhaustive report in February last.

As was to be expected from the character and ability of the board, the idea of a closure of the river to navigation, which has sometimes been unadvisedly advanced, finds no encouragement at its hands. After a careful review of the facts relating to the navigation of the river and the condition of the bridges, the report says:—

The Charles River, where it traverses the city, still remains an important tidal reservoir, and a valuable highway for commerce, which the general government should not only unceasingly protect against

wanton injury, but foster by increased facilities where such can be secured with a consistent regard to vested rights.

The conclusion of the report is as follows: —

The Board is of the opinion that, for the present, the draw-openings through the West Boston and Craigie's (Canal) bridges, although small, may be retained without material injury to commerce; but that the openings through the Charles River and Warren bridges, now 36 feet wide, ought to be enlarged, whenever the renewal of the bridges is taken in hand, to make the navigation through them "free, easy and unobstructed" for vessels exceeding about 700 tons. The Board was furnished by bridge-tenders with the names of several vessels which had applied to pass the bridges, but could not be accommodated because their beams exceeded the width of the draw; and it is fair to presume that the known deficient width of the draws prevented applications from being made by other vessels.

The draw-bridges, although of primitive type, are manœuvred by steam power, with good appliances, and the time consumed in closing and opening the draws is not so great as to detain vessels unnecessarily for this reason alone.

The basin between the Charles River and Warren bridges is so limited in area that only seven to nine vessels can conveniently anchor there at one time. The only other possible anchorage, so long as the present bridge system is maintained, lies above the last railroad bridge. Therefore it may be said in general that there is no object in a vessel bound to the upper basin endeavoring to go above the Charles River bridge, unless facilities be given for its passing the entire bridge system. In practice, vessels lie at anchor below Charles River bridge, and pass through and above it in numbers corresponding with the opportunities afforded for going beyond the railroad bridges.

For these reasons, while the Board is of the opinion that the draws of the Charles River and Warren bridges are not adequately wide for the largest class of vessels which may navigate the river, and that in the case of all the city bridges the flow of the water is excessively and needlessly obstructed, it does not recommend, in the absence of specific instructions as to the modifications to be made in the railroad bridges, that the city be required to incur at this time expenses for alterations in the bridges controlled by them, which might not conform to the alterations hereafter to be demanded from the railroad authorities.

It is, however, recommended that when extensive repairs or rebuilding of these old city bridges become necessary, they shall be made to conform to modern practice, as has been done in the case of the new Harvard bridge just completed. Such a requirement would

be far less onerous than the plans outlined by the joint commission, composed of the Harbor Commissioners and Railroad Commissioners, to which the subject was referred for report by the legislature of Massachusetts in 1870.

These recommendations were approved by the Chief of Engineers, and thereupon Secretary Proctor made the following order : —

The time fixed in the orders of the Secretary of War of December 6, 1888, requiring the cities of Boston and Cambridge to alter their bridges by the first of January, 1891, is hereby indefinitely extended, subject to further action whenever the conditions suggested by the Board require it.

The board of engineers was embarrassed by the fact that the railroad bridges, which form one system with the city bridges, were excluded from its consideration by the terms of the instructions under which it was acting. The railroad bridges, as now maintained, are not only a more serious obstruction of the river than the city bridges, but the difficulties in the way of correcting their defects are more formidable. Although orders had been served on the railroad corporations at the same time and in the same terms as on the cities, the manner of altering the railroad bridges had not been prescribed or determined ; and, until this harder problem was solved, the board could not deal intelligently with the city bridges. The proper order of consideration had obviously been inverted.

In the meantime, the railroad corporations have apparently ignored the orders of the war department. They have not asked for a revocation or modification of the orders, and have taken no steps to comply with them. The prescribed time for making the alterations has now expired. The case of the Charles River bridges is the first in the history of the government in which a Secretary of War or other national officer, in the exercise of a high discretionary power delegated by Congress, has undertaken to compel the reconstruction in this harbor of tide-water bridges long established and maintained under the hitherto unquestioned sanction of State law ; and the outcome will be awaited with much interest.

By an act of the Massachusetts Legislature, passed in 1888, the cities of Boston and Cambridge were required to widen the draws in the four highway bridges which cross Charles River next above the Harvard bridge, to 36 feet each. For reasons stated in the last report, there was some delay in complying with the act. The work has been taken in hand by the cities the past year, and, in the case of three of the bridges, the widening is now well under way or nearly finished.

The new Harvard bridge still remains unopened to travel. The delay has been due to a contest in the courts respecting the manner of constructing the avenue of approach to the bridge on the Cambridge side. The supreme judicial court has just decided that the city of Cambridge had authority, under the act of 1882, chapter 155, to lay out the avenue on its own side of Charles River at grade across the Boston and Albany railroad; that the act did not require that the city of Boston should concur in or agree to such lay-out; and that the board of railroad commissioners had no authority to order the construction by the city of Cambridge of an overhead crossing over the railroad. This decision covers all the points in controversy, and there seems to be no reason for longer delay in the completion of the avenue and the much-desired opening of the bridge to the public. As compared with all the other bridges on the river, it is a model in construction and even in architectural effect.

The private improvements in Charles River basin have been pushed vigorously the past year. The Charles River Embankment Company has extended its sea-wall about 500 feet westerly, and has dredged from the basin over 32,000 cubic yards for filling. The contractors are preparing for larger operations the present year with improved appliances. On the Boston side, the filling of the Adams estate is completed, and on the adjoining estate the sea-wall is finished to Cousens' wharf, and the filling well advanced. Substantially all the filling has been dredged from the basin, improving its navigation, its sanitary condition and its beauty.

HARBOR LINES IN BOSTON HARBOR.

A harbor line board, consisting of General Abbott, Colonels Gillespie and Mansfield, and Major Livermore, Corps of Engineers, U. S. Army, was constituted by order of the Secretary of War in 1888, under section 12 of the river and harbor act of that year, to consider harbor lines in Boston harbor. At the date of the last report, lines had been defined for some of the principal frontages of the harbor, which were described in that report.

During the past year, the harbor line board has recommended lines for substantially the whole of the harbor and its estuaries not covered the previous year, and these lines have been approved by the Secretary of War.

The sections of the harbor treated the past year are a part of the banks of the Charles River, the Mystic River and its tributaries, Chelsea Creek, the shore of East Boston from Jeffrey's Point to Breed's Island, and Dorchester Bay from South Boston to Moon Island.

In almost every case where the State had previously established harbor lines, these lines have been adopted without modification by the harbor line board as the lines beyond which no structure of any kind shall extend. In some cases, an inner "*bulkhead line*," beyond which no *solid filling* shall hereafter be permitted, has also been defined. The lines have in some instances been extended farther up the rivers or along the shore than had been done by the State. In other respects, and upon the whole, the harbor line system already established by the laws of the State has been approved and confirmed.

Descriptions of the several lines recommended by the harbor line board and approved by the Secretary of War during the last year, are appended to this report.* Copies of two of the charts, on which the more important lines in the Charles and Mystic rivers are laid down, are also annexed. Copies of the charts on which all of the lines are shown, are on file in this office. For official copies of these charts, and of the documents containing the descriptions and

* See Appendix, A.

approval of the several lines, this board has been indebted to the courtesy of the harbor line board.

LEGISLATION BY CONGRESS.

The river and harbor acts of 1884 and 1888 had inserted in them certain sections, in the nature of general laws, relating to bridges, harbor lines and the removal of wrecks in navigable waters, the provisions of which have been stated and explained in previous reports.

In the recent river and harbor act of September 19, 1890, those sections have been amended in some particulars, and other sections have been inserted extending their scope, providing severer penalties for their violation, and delegating larger discretionary powers to the Secretary of War. For information and convenience of reference, the sections of the act of 1890, 4 to 12 inclusive, are appended to this report.*

The control of Congress over waters within the limits of a State, whether fresh or tide waters, is incidental to its power, under the constitution of the United States, "to regulate commerce with foreign nations and between the several States." Its right of control is therefore limited to such waters within the several States as are accessible to and navigable by vessels engaged in foreign or interstate commerce. It extends only to such water-ways and water areas as are suitable and necessary for the convenient passage and safe anchorage of such vessels. It does not extend to all the tide waters, any more than to all the fresh waters, within State limits; nor does it include the regulation of their use and improvement for any other purposes than those of navigation.

In the absence of legislation by Congress, the questions that have hitherto arisen have been chiefly those affecting the extent and limits of the powers of the States in respect to the regulation of waters within their confines. Now that Congress has undertaken to legislate in this direction, questions are not unlikely to arise touching the extent and limits of the power of the national government in the regulation of State waters.

* See Appendix, B.

SOUTH BAY.

This bay has never been regarded of much if any value as a tidal reservoir of the main harbor, and the project of filling up the whole of it, as well as Fort Point channel which is its outlet, was recommended not many years ago by a committee of the legislature. The commerce in the bay, and especially along the channel, is now of too much importance to admit of the serious consideration of such a scheme.

Harbor lines were established in a portion of the bay as early as 1847, by chapter 278 of the acts of that year. These lines were extended around the entire bay by chapter 293 of the acts of 1856, and were slightly modified by chapter 310 of the acts of 1864.

Since these lines were established, the New York and New England railroad has been built solid across the bay, excepting a pile section of about 260 feet, and the part cut off by the railroad is no longer used or has any real value for navigation. The natural size of the bay was considerably enlarged some 40 to 50 years ago by digging away the marshes, to about the level of low water, for filling elsewhere. This artificial area, and other portions of the bay which are bare at low tide, are at times offensive and noisome.

There can be little question that it would be a public improvement to fill some portions of the bay and to deepen others. This can be done in such a way as to increase rather than diminish the present facilities for wharves and navigation. The harbor lines stand in the way of such improvement.

An act was passed in 1871, chapter 335, authorizing changes in the lines with reference to a similar improvement then in contemplation but not carried out. The present powers of this board under that act, by reason of subsequent legislation and upon other grounds, are not clear. It is recommended that such legislation be now had as will remove any obstacles which the existing harbor lines present to the improvement of the bay, under proper guards and limitations, in the direction above indicated.

MYSTIC RIVER IMPROVEMENT.

This work involves the filling and improvement of about 90 acres of land and flats lying between the north and south channels of Mystic River. The original grant was to the Mystic River Corporation, in 1855, upon the condition of deepening and improving the river.

The Boston and Maine Railroad, which has acquired the rights and assumed the obligations of the original grantee, has completed the past year the bulkhead on the line of Elm Street extended, and tide water is now excluded from the whole tract of 90 acres. The platform along the face of the wharf below Chelsea bridge has been finished, and also above the bridge to a point about 150 feet beyond the dock; and more than half the piles have been driven for its remaining length.

The dredging the last year has been done in the river above Chelsea bridge; but only a very small part of the excavation has been to the required depth. About 280,000 cubic yards of dredged material have been deposited on the enclosed area, mostly by methods of re-handling which are new to Boston harbor, and which have worked in a satisfactory manner.

The amount of filling and of required excavation in the river which remain to be done, is very much larger than can be accomplished, by the methods and apparatus now in use, within the time allowed by statute for the completion of the whole work, which expires March 1, 1891. A reasonable extension of the time may properly be granted.

GLOUCESTER, ESSEX AND IPSWICH BOUNDARY LINES.

This board was directed, by chapters 77 and 97 of the resolves of 1889, to examine and define the boundary lines in tide water between the city of Gloucester and town of Ipswich, and between the towns of Essex and Ipswich, and to report to the next General Court.

A partial report was made to the last legislature. The survey and map of the territory in dispute, then under way, have been completed the past year. A copy of the

map, much reduced in size, on which the proposed boundary lines as defined by the board are laid down, is annexed to this report.

The water area in controversy is a tidal bay, about a mile in diameter and four square miles in extent. Much the larger part of it is dry at low water. Upon considerable portions of the flats, clams are found in abundance. Each city and town has the right by statute to regulate the taking of clams within its own limits. Hence arose the question, which the courts declined to settle, as to the boundaries in the present case.

The Essex River enters the bay at its south-westerly corner, and the Castle Neck River at its north-westerly corner; and both rivers flow out through the bay, between Castle Neck in Ipswich and Two Penny Loaf in Gloucester, to the sea.

No doubt has been felt about the proper location of the tide-water line for dividing the city of Gloucester from the towns of Essex and Ipswich. The present land line between Gloucester and Essex has been extended in the same course across the bay, and out through its mouth to the exterior line of the Commonwealth in tide water as defined by this board under chapter 196 of the acts of 1881. The map is not large enough to show its stretch beyond the mouth of the bay.

The only difficulty is in regard to the tide-water line between Ipswich and Essex. The second parish of Ipswich was set off and incorporated into the town of Essex by chapter 85 of the acts of 1818. That part of the boundary line between the old and the new town which is here concerned, is described in the act as “running down said brook to the creek, so called; thence continuing down said creek to the river; thence *down the channel of said river on the north side of Hog Island to the sea.*”

The *river* referred to is the Castle Neck River; and if that river had always kept to one and the same channel, no question would have arisen as to the boundary between the towns. On the contrary, the river has had at different times two very different channels. One, the present

channel as shown on the map, extends along the shore of Castle Neck on the north side of the bay. By the other, the river, after passing Story Island and the thatch banks, turns south, and runs down on the easterly side of Dilly Island and the adjoining marsh, and unites with the Essex River near Cross Island. The southerly portion of the last described channel is still open, as indicated on the map.

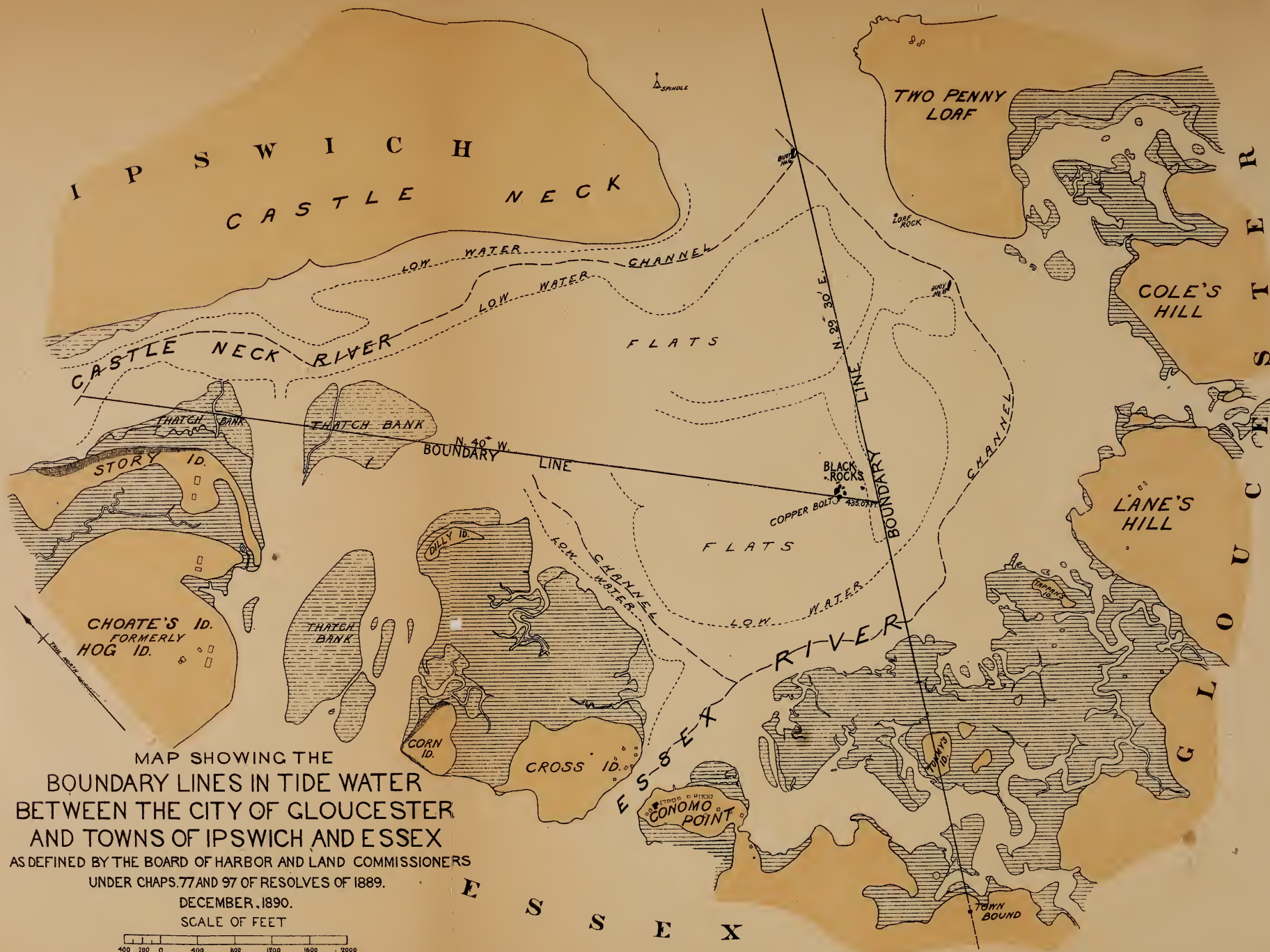
In 1792, as proved by ancient town maps, the river was flowing in the Castle Neck channel. Before 1830, it had shifted to the Dilly Island channel. The coast survey map of 1857 shows that it was then in the Dilly Island channel. Some six or seven years ago, owing probably to the damming of ice, it broke through the loose and shifting sand, and resumed the old channel along Castle Neck, where it now runs.

The changes from one channel to the other, which are liable to occur at any time from natural causes, have not been gradual but more or less sudden, and when one channel has opened, the other has closed up. If, then, "the channel of said river" is held to be the boundary line, a very large body of flats will be found sometimes in the one town and sometimes in the other.

It has seemed best, therefore, to divide the bay, as fairly as may be, by lines which are fixed and easy to run out. A cluster of rocks on the flats, known as the Black Rocks, is the only permanent landmark in the bay. A copper bolt has been placed in the highest point of the main ledge of these rocks for a monument.

As defined by the board and shown on the map, the boundary line in tide water between Ipswich and Essex begins at a point in the line which divides the city of Gloucester from said towns, which point bears South 40° East and is distant $435\frac{7}{100}$ feet from the copper bolt; and runs thence North 40° West, passing through the copper bolt, until it comes to the channel of Castle Neck River on the north side of Choate's (formerly called Hog) Island. This line gives a larger portion of the flats to Ipswich, and a larger portion of the best clam-ground to Essex.

The boundary line in tide water which divides the city of Gloucester from the towns of Essex and Ipswich, as defined



1 2 3 4 5 6 7 8 9 10
CARTER

CHARTER

CHARTER

MAP SHOWING THE
BOUNDARY LINE BETWEEN THE CITY OF CLACKAMAS
AND TOWNSHIP OF IPSWICH AND SEASIDE
AS SET BY THE BOARD OF SUPERVISORS OF CLACKAMAS COUNTY
IN THE YEAR 1900

by the board and shown on the map, begins at a stone bound near the shore in the land line between Gloucester and Essex; and runs thence North $29^{\circ} 30'$ East across the bay, passing through the south-easterly end of the line between Ipswich and Essex as above described, and out to sea until it comes to the exterior line of the Commonwealth in tide water. This line, as before stated, is an extension of the present land line between Gloucester and Essex.

As often as occasion may require, these lines can be run and staked out across the clam-grounds and flats, from the copper bolt and stone bound, one or both, by an engineer or surveyor, without difficulty. The courses as given above refer to the true meridian, and allowance must be made for variations of the magnetic needle.

FIELD AND OFFICE WORK.

Miscellaneous Surveys.

The work on the South Boston flats has, as usual, occupied the larger part of the time of the Engineer and his assistants.

In February, a survey and plan were made of the locations of the mooring buoys below Charles River bridge, for use in the hearing on a complaint that they were dangerous obstructions to steamers entering and leaving the Hoosac Tunnel docks.

A survey and plan were also made of the railroad bridge over Belle Isle Inlet, between Breed's Island and Winthrop, with reference to the plans for building the metropolitan sewer across the inlet.

In June, the positions of seventeen stations in the South Bay were determined by triangulation from the basis of the harbor re-survey, and the positions calculated and plotted on plane-table sheets, preparatory to making plans of the bay as soon as other work permits.

A survey was also made of the section of Fort Point channel between the New York and New England Railroad and Congress Street bridges, and between the draw-piers of the bridges and the wharf of the Boston Electric Light

Company, and plans and specifications drawn for dredging this section to the depth of 16 feet below mean low water.

A survey was also made of Salter's Beach in Plymouth, for a short distance north of Gurnet Light, to determine to what extent, if any, the beach had been or would be injured by the removal of fine drift-gravel, under licenses given to Mr. Joseph L. Boardman, as authorized by chapter 212 of the acts of 1881. The comparison of this survey with that of June, 1889, did not show that any material change in the beach had taken place.

In July, a plane-table survey was completed and map made, based on the triangulation done in November, 1889, as stated in the last report, of the bay at the mouth of the Essex and Castle Neck rivers, for use in defining the boundary lines in tide water between Gloucester, Ipswich and Essex, as already described in this report.

In October, an examination was made of the banks of the Connecticut River at Springfield and West Springfield, to ascertain the extent of the giving away and exposure of the banks on the West Springfield side, and of the encroachments on the Springfield side.

In October and November, a survey was made of the section of the Merrimac River and its banks lying between Haverhill and Bradford. Twenty-two triangulation points were established and connected with the work of the coast survey through the work of Professor Quimby in the determination of the state line between Massachusetts and New Hampshire. Based on these points, two plane-table sheets were made, on a scale of $\frac{1}{10000}$, showing the river from the Boston and Maine railroad bridge down to a little below the junction of Water and Groveland streets in Haverhill,—a distance of $1\frac{2}{3}$ miles. The sheets include the river and its shores between Washington, Merrimack and Water Streets on the Haverhill side, and the Georgetown Branch railroad on the Bradford side. There remains a few days' work on the Bradford side to complete the lower sheet.

This survey is preparatory to the establishment of harbor lines on the Haverhill and Bradford banks of the river, one or both.

Licenses Granted During the Year 1890.

The following licenses, eighty-one in number, have been granted the last year. The licenses which are required under recent statutes for structures in the Connecticut River and in great ponds, as well as those in tide waters, are included in the list.

Nos.

1226. Petition of the American Powder Mills for license to place a mooring for one of its powder-boats on the South Boston flats in Boston harbor. Granted January 23, 1890.
1227. Petition of the Boston, Revere Beach and Lynn Railroad Company for license to build a ferry-slip at its Boston terminus in Boston harbor. Granted January 30, 1890.
1228. Petition of the Boston Land Company for license to fill solid in Chelsea Creek at Breed's Island in East Boston. Granted January 30, 1890.
1229. Petition of Selina C. Washburn for license to fill a dock adjoining her wharf on Malden River in the city of Malden. Granted February 20, 1890.
1230. Petition of the Old Colony Railroad Company for license to fill solid the pile bridge of the Nantasket Beach railroad across an arm of Hingham Bay, near Point Allerton, in the town of Hull. Granted February 20, 1890.
1231. Petition of William Minot, Jr., for license to drive piles at his wharf on Charles River in the city of Boston. Granted February 27, 1890.
1232. Petition of the Boston and Maine Railroad for license to rebuild and widen the pile platform at Mystic wharf on the south channel of Mystic River in the city of Boston. Granted February 27, 1890.
1233. Petition of the city of Boston for license to dump snow and ice into the rivers and tide waters in and around said city. Granted March 6, 1890.
1234. Petition of the city of Salem for license to build stone piers to support water and gas pipes at North Street bridge on North River in the city of Salem. Granted March 6, 1890.
1235. Petition of the North Packing and Provision Company for license to build a wharf and well on Miller's River in the city of Somerville. Granted March 6, 1890.

Nos.

1236. Petition of Colcord Upton for license to build a wharf at Baker's Island in Massachusetts Bay in the city of Salem. Granted March 6, 1890.
1237. Petition of Simon P. Humphrey for license to build a pile wharf in Onset Bay in the town of Wareham. Granted March 13, 1890.
1238. Petition of Annie H. Litchfield for license to build a sea-wall or bulkhead and fill solid in Hull Bay in the town of Hull. Granted March 13, 1890.
1239. Petition of the Central Railroad of New Jersey for license to widen and extend Phillips wharf, on piles, in Salem harbor in the city of Salem. Granted March 13, 1890.
1240. Petition of Joseph H. Burgess for license to build a wharf, partly solid and partly on piles, in Onset Bay in the town of Wareham. Granted March 20, 1890.
1241. Petition of Daniel H. J. Holmes and Mary F. Gaff for approval of plans for building a bridge across Centreville River in the town of Barnstable, as authorized by chapter 36 of the acts of 1890. Approved March 20, 1890.
1242. Petition of the Bunker Hill Yacht Club for license to build a club-house, on piles, near the south draw of Chelsea bridge on Mystic River in the city of Boston. Granted March 25, 1890.
1243. Petition of the city of Lynn for license to build an outfall sewer in Lynn harbor in the city of Lynn. Granted March 27, 1890.
1244. Petition of the East Boston Dry Dock Company for license to build a marine railway, and to widen and extend its northerly pier, on piles, in Boston harbor at East Boston. Granted April 10, 1890.
1245. Petition of the city of Newburyport for approval of plans for building a sewer outfall in Merrimack River in the city of Newburyport, as authorized by chapter 233 of the acts of 1889. Approved April 17, 1890.
1246. Petition of the Boston and Albany Railroad Company for license to rebuild the bridge on its Grand Junction branch railroad across Mystic River in the city of Somerville and town of Everett. Granted April 17, 1890.
1247. Petition of James H. Winchell & Company for license to build stone piers for the support of a building on Little River in the city of Haverhill. Granted April 24, 1890.

Nos.

1248. Petition of F. A. Merriam & Company for license to build a pile platform, fill solid, and dredge a channel in Dorchester Bay in the city of Boston. Granted April 24, 1890.
1249. Petition of Isaac Pratt, Jr., for license to fill solid at the McKay wharf in Boston harbor at East Boston. Granted May 1, 1890.
1250. Petition of James N. Cowin for license to widen and extend his wharf by filling solid on Mystic River in the town of Medford. Granted May 8, 1890.
1251. Petition of Charles Bassett for license to build a dike with a tide-gate therein across Buck's Creek in the town of Chatham. Granted May 15, 1890.
1252. Petition of John C. Haynes for license to widen a portion of Liverpool wharf, on piles, on Fort Point channel in the city of Boston. Granted May 15, 1890.
1253. Petition of Ezra B. Whittier for license to build a pile pier in Winthrop harbor in the town of Winthrop. Granted May 22, 1890.
1254. Petition of Wilhelmina C. Clifford for license to build a timber wharf in Buzzard's Bay in the town of Dartmouth. Granted May 22, 1890.
1255. Petition of the King Philip Boat Club for license to build a boat-house in Mount Hope Bay in the city of Fall River. Granted May 22, 1890.
1256. Petition of the Lincoln Boat Club for license to build a boat-house in Sandy Pond in the town of Lincoln. Granted May 22, 1890.
1257. Petition of George R. Bradford for license to extend his wharf, on piles, in Gloucester harbor in the city of Gloucester. Granted May 22, 1890.
1258. Petition of the Lockwood Manufacturing Company for license to extend its wharf by filling solid in Boston harbor at East Boston. Granted May 29, 1890.
1259. Petition of the city of Gloucester for license to build a catch-basin in Gloucester harbor in the city of Gloucester. Granted May 29, 1890.
1260. Petition of the Chelsea Yacht Club for approval of plans for building a club-house, on piles, near Chelsea bridge on Mystic River in the city of Chelsea, as authorized by chapter 311 of the acts of 1890. Approved May 29, 1890.
1261. Petition of the Simpson's Patent Dry Dock Company for license to extend its dry dock No. 1 in Boston harbor at East Boston. Granted May 29, 1890.

Nos.

1262. Petition of the Commercial Wharf Company for license to extend the south pier of Commercial wharf, on piles, in Boston harbor in the city of Boston. Granted May 29, 1890.
1263. Petition of William H. Swift & Company for license to extend their wharf by filling solid on Chelsea Creek at East Boston. Granted June 5, 1890.
1264. Petition of the Constitution Wharf Company for license to drive piles at Constitution wharf in Boston harbor in the city of Boston. Granted June 5, 1890.
1265. Petition of Emma J. Goodnow for license to build a wharf, partly solid and partly on piles, in Lake Quinsigamond in the city of Worcester. Granted June 12, 1890.
1266. Petition of Augustus T. Cushing and others for license to build a pile wharf and float in Town River Bay in the town of Weymouth. Granted June 12, 1890.
1267. Petition of the city of Boston for license to rebuild Federal Street bridge on Fort Point channel in Boston harbor. Granted June 19, 1890.
1268. Petition of James A. Norcross for license to build a pile wharf at Monument Beach in the town of Bourne. Granted June 19, 1890.
1269. Petition of the Gloucester Lighterage Company for license to build a wharf, partly solid and partly on piles, in Gloucester harbor in the city of Gloucester. Granted June 19, 1890.
1270. Petition of John Girdler for license to widen his wharf, partly solid and partly on piles, in Beverly harbor in the town of Beverly. Granted June 26, 1890.
1271. Petition of the board of Park Commissioners of the city of Boston for approval of plans for filling solid in Boston harbor at South Boston Point in said city, as authorized by chapter 438 of the acts of 1889. Approved June 26, 1890.
1272. Petition of William O. Cutter for license to build a pile wharf and float-stage in Onset Bay in the town of Wareham. Granted July 3, 1890.
1273. Petition of Isaac Pratt, Jr., for license to build a pile platform at the McKay wharf in Boston harbor at East Boston. Granted July 10, 1890.
1274. Petition of the Gardner Boat Club for license to build a boat-house in Crystal Lake in the town of Gardner. Granted July 10, 1890.

Nos.

1275. Petition of William B. Nelson for license to extend his wharf in Mattapoissett harbor in the town of Mattapoissett. Granted July 17, 1890.
1276. Petition of Charles H. Heath, trustee, and the Riverbank Improvement Company for license to build a sea-wall and fill solid on Charles River in the city of Boston. Granted July 17, 1890.
1277. Petition of Edward Kendall & Sons for license to extend their wharf, partly solid and partly on piles, on Charles River in the city of Cambridge. Granted July 17, 1890.
1278. Petition of the Brookline Gas Light Company for license to build a sea-wall and pile platform and to fill solid on Charles River in the city of Boston. Granted July 17, 1890.
1279. Petition of John M. Brooks for license to drive piles for launch-ways and for other purposes in Boston harbor at East Boston. Granted July 24, 1890.
1280. Petition of the Lockwood Manufacturing Company for license to widen and extend its wharf, on piles, in Boston harbor at East Boston. Granted July 24, 1890.
1281. Petition of William B. Thom & Company for license to build a stone wharf on Merrimack River in the city of Haverhill. Granted August 7, 1890.
1282. Petition of the Haverhill Iron Works for license to build a stone wharf on Merrimack River in the city of Haverhill. Granted August 7, 1890.
1283. Petition of the city of Cambridge for license to rebuild and widen its portion of River Street bridge on Charles River in the city of Cambridge. Granted August 22, 1890.
1284. Petition of the city of Boston for license to widen its portion of River Street bridge on Charles River in the city of Boston. Granted August 22, 1890.
1285. Petition of the Haverhill Electric Light Company for license to extend its wharf by filling solid on Merrimack River in the city of Haverhill. Granted September 4, 1890.
1286. Petition of the Boston and Maine Railroad for license to excavate a channel and build a culvert with a tide-gate therein on Diamond Creek in the town of Revere. Granted September 4, 1890.

Nos.

1287. Petition of the city of Boston for license to widen the passage-way for vessels in North Harvard Street bridge on Charles River in the city of Boston. Granted September 11, 1890.
1288. Petition of the board of Metropolitan Sewerage Commissioners for approval of plans for rebuilding the tidal culvert crossing Saratoga Street in East Boston, as authorized by chapter 439 of the acts of 1889. Approved September 18, 1890.
1289. Petition of the board of Metropolitan Sewerage Commissioners for approval of plans for building a portion of section 9 of a main sewer in Chelsea Creek, within the location of Addison Street at East Boston, as authorized by chapter 439 of the acts of 1889. Approved September 18, 1890.
1290. Petition of the board of Metropolitan Sewerage Commissioners for approval of plans for building a pile wharf in Boston harbor at Deer Island, as authorized by chapter 439 of the acts of 1889. Approved September 18, 1890.
1291. Petition of the town of Winthrop for license to widen Shirley Street in Boston harbor near Cottage Hill in the town of Winthrop. Granted September 25, 1890.
1292. Petition of William Campbell and Wilson Campbell for license to fill flats in Charles River in the city of Cambridge. Granted September 25, 1890.
1293. Petition of Josiah C. Bennett for license to build seawalls and fill flats in Lynn harbor in the city of Lynn. Granted October 2, 1890.
1294. Petition of the city of Boston for license to extend L Street in Boston harbor at South Boston. Granted October 2, 1890.
1295. Petition of Leavitt T. Robbins for license to extend his wharf by filling solid in Plymouth harbor in the town of Plymouth. Granted October 2, 1890.
1296. Petition of Roswell C. Downer for license to build a stone breakwater at Nye's Neck in the town of Falmouth. Granted October 16, 1890.
1297. Petition of the city of Boston for license to widen the passage-way for vessels in Essex Street bridge on Charles River in the cities of Boston and Cambridge. Granted October 23, 1890.

Nos.

1298. Petition of the board of County Commissioners of Hampden County for approval of plans for building a bridge across Connecticut River between the city of Holyoke and the town of Chicopee, as authorized by chapter 350 of the acts of 1889. Approved October 30, 1890.
1299. Petition of the board of County Commissioners of Essex County for approval of plans for building a bridge across Powow River in the town of Amesbury, as authorized by chapter 66 of the acts of 1890. Approved October 30, 1890.
1300. Petition of George A. Hall for license to build a wharf by filling solid on Merrimack River in the city of Haverhill. Granted November 6, 1890.
1301. Petition of Choate Burnham for license to widen and extend his wharf, on piles, in Old Harbor Bay in the city of Boston. Granted November 6, 1890.
1302. Petition of Albin M. Richards for license to extend his wharf by filling solid on Mystic River in the city of Boston. Granted November 25, 1890.
1303. Petition of the Riverside Boat Club for license to build a boat-house, on piles, on Charles River in the city of Cambridge. Granted November 25, 1890.
1304. Petition of the West End Street Railway Company for license to dump snow and ice from bridges and wharves into tide waters in the cities of Boston, Cambridge and Chelsea, and the town of Medford. Granted December 4, 1890.
1305. Petition of the city of Boston for license to build a pile pier at the north ferry in Boston harbor at East Boston. Granted December 4, 1890.
1306. Petition of the West End Street Railway Company for license to build a pile wharf in South Bay in the city of Boston. Granted December 4, 1890.

RECEIPTS FROM GRANTS OF PUBLIC LANDS.

The amount received during the past year for grants of rights and privileges in lands of the Commonwealth, under licenses of this board for filling and for the erection of wharves and other structures in and over tide waters and great ponds, is \$14,330.24. Other like assessments for a considerable amount have been made during the year, for

which the money has not yet been paid into the treasury. Payment for such grants was first required by chapter 284 of the acts of 1874, now chapter 19, section 16, of the Public Statutes. Since the passage of that act, the total amount so received and paid into the State treasury has been \$274,894.60.

HARBOR IMPROVEMENTS BY THE UNITED STATES.

The works of the national government for the preservation and improvement of the rivers and harbors on the coast of Massachusetts, have remained under the supervision of the same able and efficient officers of the Corps of Engineers, U. S. A., who had charge of them at the date of the last report, — those on the Eastern section of the coast in charge of Lieut. Col. Samuel M. Mansfield, who is stationed at Boston, and those on the Southern section in charge of Maj. William R. Livermore, whose headquarters are at Newport.

To both of these gentlemen, as to their predecessors, this board is indebted for courteous coöperation, and the public for valuable service.

Improvements on the Eastern Coast of Massachusetts.

At the request of the board, Colonel Mansfield has kindly furnished the following condensed report of the work done in the rivers and harbors under his charge during the year 1890:—

UNITED STATES ENGINEER OFFICE,
BOSTON, MASS., December 22, 1890.

The Board of Harbor and Land Commissioners of Massachusetts.

GENTLEMEN:—In accordance with your request of this day, I have the honor to furnish the following summary of the work done by the general government, during the year, in those rivers and harbors of Massachusetts which are under my charge:—

1. Newburyport Harbor.

The general project for the improvement of this harbor has not been changed.

No active operations have been in progress, and the condition

of the several works of improvement remains essentially as stated in the report for last year.

The entrance channel over the bar has straightened and deepened, as shown by the survey of June, 1890.

The funds provided for this work by the act of September 19, 1890, \$25,000, will be expended during the next working season in extending the full section of the north jetty.

2. *Harbor of Refuge, Sandy Bay, Rockport.*

No change has been made in the project.

During the year 40,039 tons of rubble-stone were deposited in the breakwater, and its sub-structure is now essentially completed between cross ranges 140 and 3,540.

The present available funds will deposit, approximately, 185,000 tons of stone in the sub-structure, and will extend it about 750 feet.

3. *Gloucester Harbor.*

The condition of the improvement remains as stated in the report for last year, no work having been done.

The sum of \$15,000 now available will be expended in widening the channels in Harbor Cove 100 feet, and in completing the proposed improvement of the main harbor from its entrance to the steamboat wharf.

4. *Manchester Harbor.*

No change has occurred in the condition of this improvement. During the next working season, a channel 40 feet wide, and 4 feet deep at mean low water, will be dredged from the entrance of the harbor to the railroad bridge.

5. *Salem Harbor.*

The funds provided for this harbor by the act of September 19, 1890, will be expended in dredging a channel 50 feet wide from deep water off Derby wharf light to the head of navigation in South River. This channel will be 8 feet deep at mean low water to near the inner end of Derby wharf, and thence 6 feet deep.

6. *Lynn Harbor.*

No change has taken place in the condition of this improvement since the date of the last report. The present available funds will be expended in completing the anchorage basin and in widening the inner channel.

7. *Winthrop Harbor.*

The funds now available for this harbor will be expended in dredging a channel 3 feet deep at mean low water, and 35 feet wide, from the entrance to Rice's wharf.

8. *Boston Harbor.*

No change has been made in the general project for the improvement of this harbor. During the year the ledges uncovered by dredging at the Upper Middle were removed, and repairs were made to the north head sea-wall at Deer Island.

A detailed survey of the west end of Brewster spit showed that the main ship-channel had decreased in width, since it was dredged in 1874, to such an extent that the 23-foot curves, at mean low water, were but 475 feet apart.

The funds now available for this harbor will be expended in widening the main ship-channel, at the west end of Brewster spit, to the full projected width, 625 feet; in extending the Gallop's Island sea-wall about 300 feet to the south-east; in repairing the sea-wall at Great Brewster; in extending the rip-rap shore protection at Long Island; in widening and deepening the channel between Nix's Mate and Long Island so that it will be 300 feet wide, 15 feet deep at mean low water; in widening the channel leading to Nantasket beach so that it will be 150 feet wide, 9½ feet deep at mean low water; in extending the main ship-channel from Grand Junction wharf towards Jeffrey's Point, approximately 300 feet wide, 18 feet deep between Grand Junction wharf and the most eastern dry dock, thence gradually shoaling to a junction with 15 feet depth off Jeffrey's Point; in continuing the improvement of Charles River when the draws in the upper bridges shall have been altered; and for such other dredging, blasting, or repairs of sea-walls as may be found necessary.

9. *Hingham Harbor.*

No change has occurred in the condition of this improvement. The funds now available will be expended in deepening the channel to 10 feet at mean low water.

10. *Scituate Harbor.*

The project for the improvement of this harbor has not been changed. During the next working season the present available funds will be applied in widening and deepening the channel connecting the anchorage basin with the town wharves, so that it will be 100 feet wide, 3 feet deep at mean low water.

11. Plymouth Harbor.

No change has occurred during the year. The funds provided by the act of September 19, 1890, will be expended in completing the basin, and in widening the channel of approach to 130 feet.

12. Wellfleet Harbor.

The general project of improvement remains unaltered.

No work has been done during the year, nor is any expected immediately, as the funds provided for this harbor by the last river and harbor act are not sufficient to effect any appreciable benefit to commerce.

13. Provincetown Harbor.

No work was done during the year. A bulkhead about 2,000 feet long will be built, during the coming working season, on the inside of Long Point to cover its weakest section, about $\frac{1}{2}$ mile north-west of Wood End Light.

14. Merrimack River.

No work has been done during the year, and the funds now available are specifically appropriated for the improvement of Mitchell's Falls.

15. Powow River.

No action by the town authorities of Amesbury, in the matter of the drawbridge, has as yet been reported to this office, which will warrant the expenditure of the funds now available.

16. Ipswich River.

No change in the condition of this improvement has occurred. The funds now available are not sufficient to complete the present project.

17. Weymouth Fore River.

The general project for the improvement of this river is to widen and deepen the natural channel, so that six feet depth at mean low water can be carried to the head of navigation. The projected channel will be 100 feet wide to near the wharves at Weymouth Landing, thence to Braintree bridge 80 feet wide, and above the bridge 50 feet wide.

The present available funds will be applied in dredging a channel of the full projected depth, 40 feet wide to Braintree bridge, and 25 feet wide above this bridge.

During the year surveys have been made, and projects of improvement are being considered, for the following localities: Kingston harbor, Weymouth Back River, Town River, Chatham harbor, Essex River, Mystic and Malden rivers.

It will be noticed that but little progress has been made in most of the improvements during the year. This is owing to the exhaustion of the funds provided by the act of 1888, and the very late date during the present year when additional funds were provided.

Very respectfully, your obedient servant,

S. M. MANSFIELD,

Lieutenant Colonel of Engineers.

Improvements on the Southern Coast of Massachusetts.

The board is indebted to the courtesy of Major Livermore for a copy of the official report of the work done in the rivers and harbors under his charge during the year ending June 30, 1890, from which the following facts are taken:—

1. Hyannis Harbor.

No work was done during the year ending June 30, 1889. During the last year the work of dredging in the 15½-foot anchorage ground protected by the breakwater, was resumed with dredge, tug, and scows belonging to the general government. The execution of the project of deepening this anchorage area will be continued.

The amount available for the work, including an appropriation of \$8,000 by the river and harbor act of September 19, 1890, is \$9,916.00.

2. Nantucket Harbor.

During the last year 6,055 tons of stone have been placed in the eastern jetty under a contract, and 830 tons with plant belonging to the United States.

It was reported in May, 1890, that the steam-boat running to Nantucket had difficulty in entering the harbor on account of the shoaling of the channel. A survey in June showed that the 7½-foot channel still existed, but that it was to the eastward of the course followed by the steam-boats, and about in the same position as the preceding November.

It is proposed to continue the construction of the eastern jetty as far as the funds will permit. The amount available, including

\$25,000 appropriated by the river and harbor act of 1890, is \$25,048.70.

3. *Vineyard Haven Harbor.*

The plan of improvement contemplates the protection of the chops at the mouth of the harbor from the action of storm waves, by jetties and other works along the shore.

A temporary wharf and three jetties, 150 feet, 80 feet, and 100 feet long, were completed on the West Chop the last year. The work of protection will be continued, beginning at the East Chop.

The amount available, including \$10,000 appropriated by the river and harbor act of 1890, is \$11,661.00.

4. *Wareham Harbor.*

The dredging of the southern half of Reach No. 8 to a width of 175 feet and depth of 10 feet was completed, and the Middle Ground, a shoal in mid-channel of Reach No. 9, was removed, during the last year.

The amount available for continuing the improvement, including an appropriation of \$5,000 by the river and harbor act of 1890, is \$5,031.47, which will be applied to the completion of the channel and the further building up of Long Beach.

5. *New Bedford Harbor.*

During the last year, 43,665 cubic yards of mud, sand and gravel were dredged in excavating a channel, 100 feet wide and 18 feet deep at mean low water, from the deep water of Buzzard's Bay, near the 11-foot bank, to the vicinity of the New Bedford wharves.

The work of dredging in the new channel will be continued with the funds available, \$10,033.98, including an appropriation of \$10,000 by the river and harbor act of 1890.

6. *Edgartown Harbor.*

The sum of \$2,000 was appropriated by the river and harbor act of 1890 for improving the inner harbor by dredging, and will be expended for that purpose.

7. *Taunton River.*

No work was done in this river the last year. The sum of \$7,012.78 now available, including an appropriation of \$7,000 by the recent river and harbor act, will be applied in completing the

widening and deepening of the channel at a few points above Berkley bridge, and in the removal of a small amount of ledge rock uncovered in dredging below the bridge.

Vessels of 11 feet draught can now reach Taunton at the head of navigation.

CONNECTICUT RIVER.

The "general care and supervision of the Connecticut River within the confines of this Commonwealth, and of the banks thereof, and of all structures therein," were committed to this board by chapter 344 of the acts of 1885. This was done "in order to prevent and remove unauthorized encroachments and causes of every kind which may in any way injure the said river, and in order to protect and develop the rights and property of the public therein."

As a means of securing these ends, it was provided in the act that all persons authorized by the general court to build any structures in the river, should first obtain from this board its approval of the plans and mode of performing the work; and the board was further empowered to license the building of structures in the river upon such terms as it should prescribe. The provisions of chapter 19 of the Public Statutes applicable to structures in tide waters, were in general made applicable to structures in this river.

Since the passage of this statute, the board has not infrequently been called upon to approve and license new structures, or to investigate cases of actual injury or threatened danger from the natural action of the river, or from structures built and encroachments made by riparian owners and others. There is evident need of the regulation and protection which the act was designed to secure, and its provisions will prove more useful as they come to be better known and understood.

In order, however, that the statute may fully accomplish the desired results, there should be a more prompt and effectual remedy than it now provides for the prevention and abatement of unauthorized and injurious works.

It is provided in chapter 19, section 17, of the Public Statutes, that every erection and work made or done in *tide water* without authority from the general court or from

this board, or in a manner not sanctioned by the board where its approval or license is required, shall be deemed a public nuisance, and be liable to indictment as such; and that the board may order suits on behalf of the Commonwealth to prevent or stop any such nuisance by injunction or otherwise; and that the attorney-general and district attorneys within their districts shall conduct such suits. The same provision is found in chapter 318, section 6, of the acts of 1888, for the protection of *great ponds*. It is recommended that similar provision be made for the more effectual protection of the Connecticut River.

Protective Works at Hadley.

The work authorized by the General Court to be done under the direction of this board “to prevent the further inroads of the Connecticut River upon the northerly side of the town of Hadley, and the destruction of the principal streets in said town,” has been completed. The necessity for undertaking the work, and the methods of conducting it, have been explained in previous reports.

The operations of the last year, and the success of the work so far as its results can now be known or foreseen, are detailed in the following report of Mr. Emory C. Davis of Northampton, who has been the engineer in immediate charge of the work from the beginning, conducting it with much skill and good judgment, and to the entire satisfaction of the board:—

To the Board of Harbor and Land Commissioners of Massachusetts.

GENTLEMEN:—The following is a report upon the work done the past year for the protection of the town of Hadley against the further encroachments of the Connecticut River upon said town, as provided for by chapter 95 of the resolves of 1888, and chapter 17 of the resolves of 1889, of the legislature of Massachusetts.

The work done during the summer and fall of 1889, in sloping the banks of the river and laying mats and riprapping thereon, was set the past spring with young willows, and these have made a satisfactory growth during the summer, and will serve as a support for the riprap work after the decay of the mats above the water line.

Soundings were taken in June last, on the same lines across the river as in previous years, to ascertain what changes, if any, had taken place in the general character and profile of the river bottom since the commencement of the protective works in 1888. These soundings are shown on the accompanying profiles of the river bottom. The black lines indicate the contour of the bottom on the different lines across the river in June, 1888, before the protective works were commenced; the red lines, the contour on the same lines across the river in June, 1889; and the green lines, the contour in June, 1890.

The soundings of June last show a decided shoaling of the water against the protective works, and a corresponding scouring on the bottom of the river and increase in depth of water on the opposite side; and, so far as can be ascertained, the works are accomplishing in a highly satisfactory manner the results anticipated at the commencement of the work.

The work done the past season has been confined principally to completing and securing the work at the head of Front Street, where left in an unfinished condition at the close of operations in 1889, consequent upon the usual fall freshets. Mats and riprap work have also been laid in places on the bank of the river for a distance of 400 feet below Front Street, where there were indications of scouring and weakness in the banks.

Judging from all present appearances, and from the general conduct of the river against these works, the town of Hadley is effectually protected from further encroachments of the river on its lands within the limits of these works.

The total cost of the work done and material furnished the past season is \$613.04, including the cost of setting willows and other work done in the spring. All bills incurred in the prosecution of the work have been paid, and all claims presented by parties for damage to crops, brush taken, etc., have been satisfactorily adjusted and paid, with the exception of that of Mr. Thaddeus Graves of Hatfield, for a small lot of brush taken in 1889, of which mention was made in my report for that year.

Respectfully submitted,

E. C. DAVIS,

NORTHAMPTON, MASS., December 20, 1890.

Superintendent.

The whole amount which has been appropriated for the protective work at Hadley, is \$30,000. The total cost has been \$29,581.55, leaving a balance of \$418.45 uncalled for in the treasury.

River Banks at West Springfield.

In September last, the board was petitioned by the selectmen of West Springfield to investigate the condition of the banks of the river in that town, which, it was alleged, were wearing away and caving in, and thus undermining a dike which had been built along the bank for the protection of the public highways of the town, and the private property of a large number of its inhabitants, in times of freshet.

The locality was visited in October, and such examinations were made by the engineer of the board and his assistant as the high stage of the water at that season of the year would permit. It was found that the bank was caving and receding in several places on the West Springfield shore, and at some points quite rapidly. The greatest wearing was in the vicinity of the Boston and Albany railroad bridge; and, about 70 feet below the bridge, it had reached to within 8 to 12 feet of the foot of the slope of the dike.

It was also found that at various places on the opposite bank, in the city of Springfield, retaining walls and other structures had been built by the railroad companies and others below the high-water line, and that, in some places, the dumping of a considerable or large amount of ashes, cinders and other material, outside or beyond the line of the walls, was going on. These encroachments tend to direct the force of the current against the West Springfield bank, and, by narrowing the width of the river channel, to increase the height of the water in times of freshet; and they are likely to be especially injurious when made on that section of the river opposite the dike.

This dike appears to have been built under the direction of the county commissioners, pursuant to the provisions of chapter 80 of the acts of 1868, the cost being apportioned to the town and the several owners of land benefited. It is to be maintained, repaired or rebuilt by the town, the expense to be divided in like proportions by the selectmen, as provided in chapter 389 of the acts of 1869.

For the distance of about 100 feet immediately below the

railroad bridge, the dike was most in need of immediate repair. A temporary bulkhead had been built by the town authorities, which would probably be of little use unless backed by earth and rubble. But there appears to be ample statute provision for the maintenance of the dike, and the emergency and cost do not at present seem to be beyond the reasonable ability of those most directly concerned to provide for.

But the unauthorized and injurious encroachments on the Springfield side of the river ought not to continue. If these are prevented, expedients may be adopted to arrest the wearing of the opposite bank now going on. It is the intention of the board to make further investigations when the season of low water in the river arrives.

LEASE OF HANGMAN'S ISLAND.

All lands and waters within the territorial limits of the Commonwealth, to which no individual or body corporate shows or can show title, are the property of the Commonwealth. It is to be presumed in such cases either that the State and its predecessors, the Colony and Province, have never granted the original title derived from the crown of England, or else that the title has reverted in the State by escheat or otherwise.

The State not only has jurisdiction or dominion, as the sovereign power, over such lands and waters, but is the owner of the fee, and may convey or lease them as proprietor.

Outside of the public domain in tide waters and great ponds, and the Province lands in the town of Provincetown, it is not known or supposed that there are any considerable tracts of territory to which the State holds title as above. There are, however, parcels of such land. Quite a number, in the form of islands in tide waters and great ponds, have come to the knowledge of the board during the last few years; and leases of some of them have been given in the name of the Commonwealth.

The board is authorized, with the approval of the governor and council, to lease public lands for periods not

exceeding five years. Such a lease (see Appendix, D) has been given the last year of Hangman's Island in Boston harbor.

This island, less than an acre in extent, is within the tide-water limits of the city of Quincy; but neither that city nor any other municipality or person has shown or claimed the ownership of it. The island has been occupied for some years by a small colony of industrious and thrifty fishermen, who desired to acquire a legal right of possession and improvement, and to have the power to exclude persons making it a place of irregular resort. The lease has been given to a trustee for their common use and benefit.

The foregoing Report is respectfully submitted.

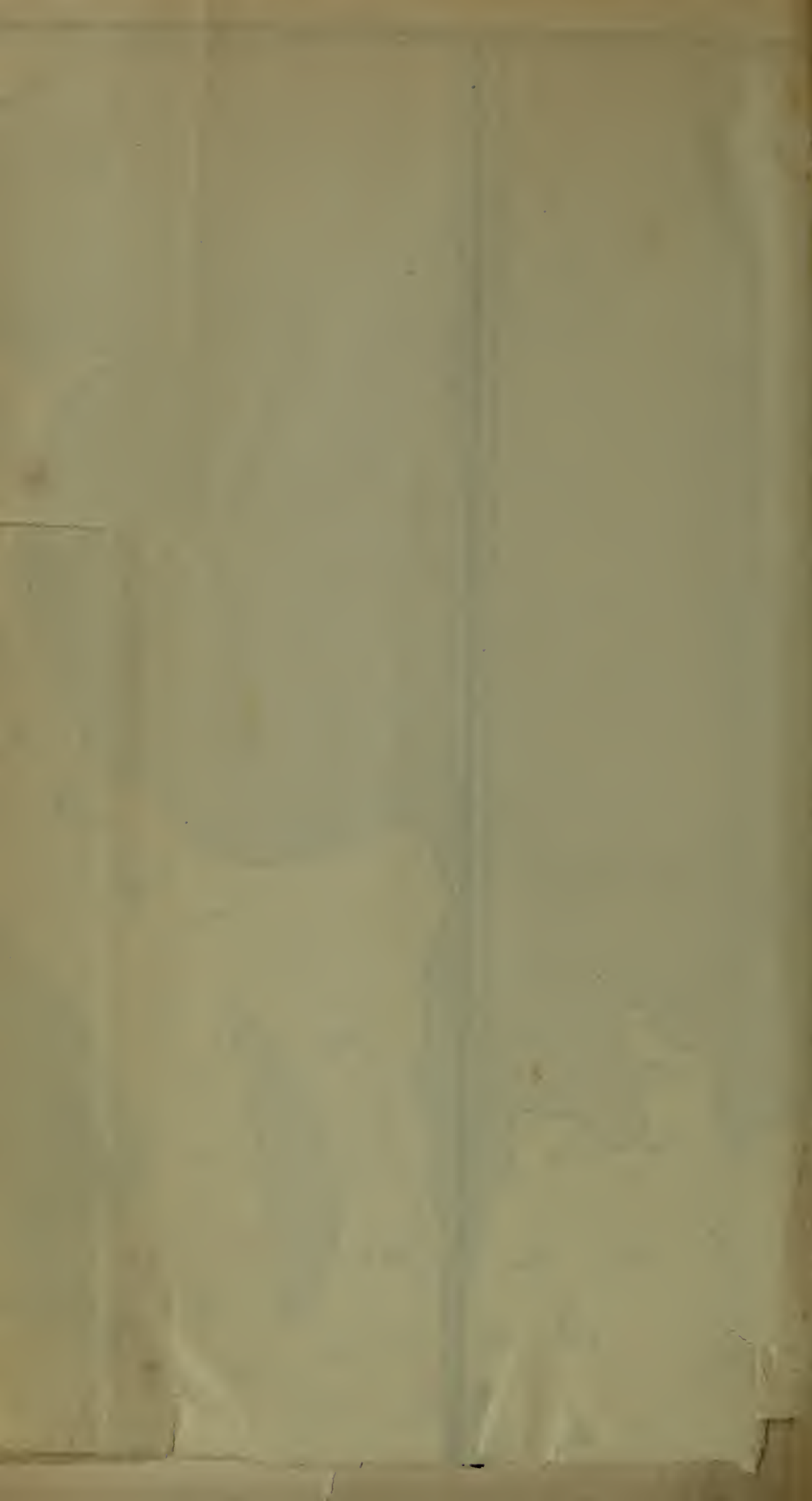
JOHN E. SANFORD.

JOHN I. BAKER.

CHARLES H. HOWLAND.

BOSTON, January 1, 1891.





APPENDIX.

APPENDIX.

[A.]

[See page 13 of this Report, *ante.*]

ESTABLISHMENT OF HARBOR LINES IN BOSTON HARBOR, AS RECOMMENDED BY THE HARBOR LINE BOARD AND APPROVED BY THE SECRETARY OF WAR, DURING THE YEAR 1890.*

I. CHARLES RIVER.

Left Bank of Charles River from Grand Junction Railroad Bridge to the Navy-Yard — Pier and Bulkhead Lines.

The State of Massachusetts has never fixed bulkhead as distinguished from pier-head lines. The Board has deemed it best to do so, and the accompanying maps sufficiently indicate the proposed location of the bulkhead lines, beyond which it is understood that no solid constructions shall hereafter be extended.

On the left bank of the Charles River basin, between Grand Junction Railroad bridge and Craigie's bridge, the pier and bulkhead line has been drawn to coincide with the line established by the State legislature.

The tidal prism of the Charles River basin has already been unadvisedly reduced, and this line contemplates a still further reduction; moreover, the forest of piles driven in the water-way below interferes with the current at the mouth of the river. A comparison of the survey of 1888 with that of 1861 shows a shoaling below the bridges of 712,415 cubic yards, reducing the average depth by 3.66 feet over an area of more than 120 acres.

Several Boards and all the officers of the Corps of Engineers, who for many years have discussed and reported upon this subject, have insisted upon the preservation of the Charles River

* The following explanations and descriptions of the several Harbor Lines as approved by the Secretary of War, are taken from the Reports of the Harbor Line Board recommending their adoption.

basin as a tidal reservoir for the maintenance of the channels of the harbor. But heretofore the General Government has never exercised the right to control and direct this matter, although the fact of these encroachments has been officially placed on record. Meanwhile the State of Massachusetts has authorized the filling up of this basin to the line above mentioned without a corresponding enlargement of the tidal prism in other places, and has granted privileges involving a great outlay of capital. To move the pier and bulkhead line back as would be desirable for the "protection and preservation of the harbor," would therefore interfere with vested rights of great value. In granting these privileges the State of Massachusetts has virtually assumed the responsibility for any injury to the harbor that has accrued or may accrue from this cause, and the Board therefore recommends for the approval of the Secretary of War the lines above indicated.

From Craigie's bridge to the navy-yard at Charlestown, the Board has deemed it expedient for the "preservation and protection of the harbor" to establish a bulkhead line, as well as a pier-head line. These two lines coincide as far as Warren bridge, and up to the Eastern Railroad bridge conform to the existing harbor line enacted by State law. Beyond the Eastern Railroad bridge the State harbor line is abandoned, and the new lines, located coincidently, assume a new direction, closer to the original shore line, as far as Warren bridge. Eastward of Warren bridge the pier-head line coincides with the State harbor line as far as the navy-yard, while the bulkhead line follows a nearly parallel course to the northward, at a distance of 600 feet, approximately. The State line and the proposed lines are delineated upon accompanying charts.

The harbor lines which are recommended for adoption are defined as follows:—

Beginning at a point on the northerly side of West Boston Bridge at its intersection with the face of the wharf, and marked by a copper tack through an iron plate on the cap outside of the brick sidewalk, and indicated on the plan by the letter A; thence running southwesterly on a curve of 951.34 feet radius (tangent to a line to be hereafter described running between West Boston and Craigie's bridges) for a distance of 503.01 feet; thence continuing southwesterly on a straight line tangent to said curve for a distance of 6,838.19 feet; thence westerly on a curve of 1,200 feet radius tangent to the last named line, for a distance of 496.97 feet; thence westerly on a straight line tangent to the last named curve to the Grand Junction Railroad Bridge. Again beginning at the point on the northerly side of West Boston Bridge marked A (previously described); thence northeasterly to point B, which is on the southerly side of Craigie's Bridge at its intersection with the face of the wharf,

and is marked by a copper tack through an iron plate on the cap outside of the sidewalk, and is referred to point B', which is at the southeasterly corner of the Boston and Lowell machine-shop; distance from B to B', 73.39 feet; bearing from B to B', $224^{\circ} 46' 19''$; thence northeasterly to point C at the southerly side of the Boston and Lowell Railroad passenger bridge at its intersection with the face of the wharf, and marked on the cap-sill of the bridge by a copper tack through an iron plate; thence the line continues northeastwardly to the point C'.

The point C' is 58 feet southerly (measuring along the face of the solid bulkhead) from the intersection of the line B C (just described) prolonged to an intersection with the solid bulkhead of the Fitchburg Railroad Bridge; C' is 853 feet approximately northeasterly from C.

From C' the line follows the faces of the solid bulkhead of the Fitchburg Railroad in an easterly direction to the point D', which is at the intersection of said solid bulkhead with the westerly side of Warren Bridge.

At the point D' the pier and bulkhead lines separate. The pier-head line lies in the west face of Warren Bridge to the point D, which is about 66 feet southerly from the outer face of the wharf on the same westerly side of Warren Bridge, and is marked by a copper tack through an iron plate; thence the pier-head line extends to the point E, which is at the easterly side of Charles River Bridge, about 80 feet southerly from the outer face of Tudor's Wharf on the same easterly side of said Charles River Bridge, and is marked by a copper tack through an iron plate; thence northeasterly to the point F, which is about 80 feet southeasterly from the southwesterly corner of Hittinger's Wharf, and nearly in the alignment of the westerly side of said Hittinger's Wharf produced, and is referred to point E; distance from point F to point E, 379 feet; bearing from point F to point E is $59^{\circ} 6' 27''$; thence northeasterly to point G, which is at the southwesterly corner of the navy-yard shears wharf, and is referred to point G', which is near the same southwesterly corner of the said navy-yard shears wharf, and is marked by a copper tack through an iron plate; distance from G to G', 1.40 feet; bearing from G to G', $150^{\circ} 35'$.

From the point D' the bulkhead line runs northeasterly in a straight line (parallel to the pier-head line F G) 1,470 feet approximately to an intersection with the boundary wall of the navy-yard.

[Approved by the Secretary of War, February 13, 1890.]

Charles River from near Brookline Street Bridge to Market Street Bridge.

The State of Massachusetts has never established lines upon this portion of the river, but the Board has deemed it necessary to do so. The lines recommended are indicated upon the chart and described as follows :

The line on the north side of Charles River begins at the Grand Junction Railroad Bridge, at the intersection of the east side of the

bridge and the harbor line approved by the Secretary of War, February 13, 1890; thence in a straight line, making an angle with the harbor line above referred to of $166^{\circ} 20'$, measuring from a northeasterly to a northwesterly direction, 1,020 feet approximately to the point B, which is situated on a line parallel to and 600 feet north of the northeastern rail of the main line of the Boston and Albany Railroad; thence parallel to said rail 675 feet to the point C; thence to the point D by the arc of a circle of 860 feet radius, tangent to the line last described, said arc subtending an angle at the center of $64^{\circ} 45'$, measuring from a southwesterly to a westerly direction; thence, on a tangent to the last described circle, 850 feet to the point E; said tangent on the line D E, if produced, will intersect the east side of River Street Bridge produced 155 feet northeastward from the face of the easterly stone abutment of said bridge; thence to the point F at the southeast corner of said abutment; thence, following the face of said abutment and the faces of the stone wharf of the Riverside Press Company, to the point G at the northwest corner of said stone wharf; thence to the point H, which is at the northwest corner of the solid abutment of Western Avenue Bridge on the Cambridge side; thence to the point I, which is in the line of the south side of the first street north of Sands street (Cambridge) extended westerly 320 feet from the west side of Banks street; thence to the point J, which is 400 feet from the west side of Banks street, measuring westerly along the south side of the second street north of Sands street; thence to the point K, which is at the southeast corner of the wharf at the foot of Otter street; thence to the northwest corner of said wharf; thence to the southeast corner of Wellington's Wharf; thence to the southwest corner of said wharf; thence to the west corner of College Wharf; thence to the east corner of the solid abutment of the Brighton Street Bridge on the Cambridge side; thence to the point L, which is in the line of the west side of that part of Murray street which runs southwesterly, extended southwesterly 760 feet from the south side of Lyman street; thence to the point M, which is in the line of the north side of that part of Murray street which runs southeasterly, extended northwesterly 830 feet from the west side of Brighton street; thence to the southeast corner of the Cambridge Gas Company's Wharf; thence to the point N, which is in the line of the east side of Willard street extended southerly 180 feet from the north side of Mount Auburn street; thence to the point O, which is 115 feet from the north side of Mount Auburn street, measuring at right angles therewith from a point 155 feet west of the west corner of Willard street; thence parallel to Mount Auburn street 315 feet to the point P; thence to the southeast corner of the Monument Wharf, marked Q on the tracing.

The line on the south side of Charles River begins at the northeast corner of the solid part of Abbot's Wharf, near Brookline Street Bridge, and at the end of the harbor line approved by the Secretary of War July 27, 1889; thence in a straight line 980 feet to the point B', which is 120 feet distant from the northerly rail of the Boston and Albany main track; thence parallel to said rail 830 feet to the point C'; thence to the point D' by the arc of a circle of 1,200 feet radius tangent to the line

last described, said arc subtending an angle of $66^{\circ} 12'$ at the center, measuring from a southwesterly to a westerly direction; thence, tangent to the circle last described, 915 feet to the point E' ; said tangent if produced will intersect the east side of River Street Bridge 65 feet, more or less, northeast from the solid abutment of the bridge on the Boston side; thence to the point F' at the north corner of the solid abutment of Western Avenue Bridge on the Boston side; thence, parallel to the line HI on the opposite side of the river, 500 feet to the point G' ; thence to the point H' , which is 315 feet distant from the opposite point J , measuring on a line at right angles to the line IJ at J ; thence to the point I' , which is 280 feet distant from the opposite point K , measuring on a line perpendicular to the face of the wharf at K ; thence to the point J' , which is 300 feet from the northwest corner of the opposite wharf, measuring perpendicular to the face of the wharf at said corner; thence to the point K' , which is 300 feet from the east corner of Wellington's Wharf, measuring on a line perpendicular to the face of said wharf at said corner; thence to the point L' , which is 320 feet from the west corner of College Wharf, measuring on a line perpendicular at said corner to the line joining said corner with the west corner of Wellington's Wharf; thence to the east corner of the solid wharf east of Brighton Street Bridge; thence along the faces of said stone wharf to the abutment of the Brighton Street Bridge and the face of the stone wharf west of said bridge, and continuing in said line 280 feet from west side of bridge to a point marked M' ; the line last described makes an angle of $76^{\circ} 26'$ approximately with the west side of Brighton Street Bridge, measuring from a southwesterly to a westerly direction; thence to the point N' , which is 340 feet from the opposite point L , measuring on a line bisecting the angle at L ; thence to the point O' , which is 340 feet from the opposite point M , measuring on a line perpendicular to the line joining the point M with the southeast corner of the gas wharf; thence to the point P' , which is 240 feet from the southeast corner of said wharf, measuring on a line perpendicular to the face of said wharf at this corner; thence to the point Q' , which is in the east line of Willard street extended southward 420 feet from the north side of Mount Auburn street; thence to the point R' , which is 320 feet from the north side of Mount Auburn Street, measuring on a line perpendicular thereto through the opposite point O ; thence to the point S' , which is distant 210 feet from the opposite point P , measuring on a line bisecting the angle at P ; thence to the point T' , which is 200 feet distant from the east corner of Monument wharf, marked Q on tracing, measuring on a line perpendicular to the line joining said corner with the point P .

Above the points Q and T' the lines follow the meanderings of the river as laid down on the map. They are parallel and 200 feet apart to the northwestern corner of Cassidy's Wharf near Arsenal Street Bridge; thence they gradually narrow to 140 feet at the bridge, and preserve this width to Market Street Bridge.

[Approved March 17, 1890.]

II. MYSTIC RIVER.

FROM THE MOUTH OF THE RIVER TO MEDFORD STREET BRIDGE.

South side of South Channel of Mystic River — Pier and Bulkhead Lines.

The pier and bulkhead lines are coincident, beginning at the northwesterly corner of the sea-wall of the United States navy-yard, and run westerly in a straight line to the present northwesterly corner of Holmes' Wharf; thence continue westerly in a straight line to the present northeasterly corner of Stone's Wharf; thence continue westerly, following and coinciding with the northerly face of said Stone's Wharf, and continue in the same direction to the present northeasterly corner of Clark & Smith's Wharf; thence continue westerly in a straight line to a point in the northeasterly line of Elm street produced northerly at the westerly end of said South Channel, and distant 150 feet southerly from the northwesterly corner of said channel as said channel is defined in chapter 481 of the acts of the general court of Massachusetts of the year 1855. This line coincides with the line established by the State in chapter 302, acts of 1874.

South side of Mystic River — Pier and Bulkhead Lines.

Beginning at the point where the southeasterly line of Johnson's Wharf extended to the North Channel intersects a line drawn from the northeasterly corner of Tuft's mill-pond to a point on Chelsea Bridge 700 feet northerly from the northerly side of the south draw in said bridge, the line runs easterly 820 feet by an arc of a circle curving northerly, and having a radius of 3,500 feet; thence continues easterly by a straight line tangent to said arc, and in such a direction that it shall pass through a point on the northwesterly side of said bridge 770 feet southerly of the southerly side of the north draw in said bridge, running by said straight line to a point 341 feet westerly of the westerly side of said bridge; thence running southeasterly by an arc of a circle turning southerly, and having a radius of 675 feet, said arc to be continued until a straight line drawn tangent to said arc would, if continued, pass through the northeasterly corner of the timber dock of the navy yard of the United States, said line tangent to be continued to the northerly side of the South Channel to a point 500 feet distant from said corner of said dock, and 817 feet distant from the easterly side of Chelsea Bridge by a line drawn at right angles with said bridge; thence running westerly by a straight line which extended would strike the line of the northeasterly side of Elm street produced 500 feet from the northerly side of Medford street measured on said northeasterly side of Elm street, to a point 320 feet easterly from said northeasterly side of Elm street produced; thence running southwesterly by an arc of a circle

turning southerly, and having a radius of 600 feet, to a point on said easterly line of Elm street extended northerly 375 feet from the northerly side of Medford street. This line coincides with the line established by the State in chapter 481, acts of 1855, and chapter 150, acts of 1867.

The portion of the line thus described between its point of beginning and where it first intersects the easterly line of Elm street produced northerly to the channel, and a straight line drawn from this point of beginning to the northeasterly corner of Tuft's mill-pond, is to be considered a pier-head line beyond which no pile structure shall be extended; and the remainder of the line above described is to be considered a bulkhead line beyond which solid filling shall not hereafter be permitted.

Beginning again at the point where the line above described first intersects the northeasterly line of Elm street produced northerly to the channel, the bulkhead line follows the line of the northeasterly line of Elm street produced northerly, in a southerly direction to a point 600 feet distant from the pier-head line measured on a line at right angles thereto; thence runs westerly, in a line parallel to and 600 feet inside of the pier-head line, to the easterly face of the wall bounding Tuft's mill-pond on the east; thence along the face of this wall to the northeasterly corner thereof; thence the pier and bulkhead lines are coincident, and follow the channel-face of Tuft's mill-pond wall to the southerly abutment of the Malden Bridge; thence along this solid abutment and its northeasterly face to the north corner thereof; thence in a straight line which, if produced, will strike the easterly corner of the solid filling of the Boston and Maine Railroad Company's coal dock above the Eastern Railroad bridge, to the easterly face of the Eastern Railroad bridge; thence along the easterly face of this bridge to a point distant 375 feet northeasterly from the northeasterly corner of the solid abutment of said last-named bridge on the southerly side of the channel; thence the pier-head line runs northwesterly to a point on the easterly side of the bridge of the Boston and Maine Railroad, distant 625 feet northerly from the northeasterly corner of the solid abutment of said last-named bridge on the southerly side of the channel; and the bulkhead line between the Eastern Railroad Bridge and the Boston and Maine Railroad Bridge is parallel to and 30 feet within said pier-head line.

The pier-head line so described between the Eastern and Boston and Maine Railroad bridges coincides with the line established by the State in chapter 231 of the acts of 1873.

The line of the channel wall of Tuft's mill-pond was established as a harbor line by chapter 293 of the acts of 1856. Between the southeasterly line of Johnson's Wharf prolonged and Tuft's mill-pond, and between the Malden and Eastern Railroad bridges, the State has established no harbor line.

Beginning again at the point of intersection of the bulkhead lines of the northerly side of the South Channel and Main Channel, said point being 500 feet in a northerly direction from the east corner of the timber dock of the United States navy-yard, the pier-head line coincides with

the bulkhead line of the Main Channel for a distance of 605 feet; thence runs northerly in a straight line to a point which is distant 385 feet easterly from the easterly side line of said avenue, measuring at right angles to said avenue from a point in the said easterly side line, which latter point is distant 100 feet southerly from the top face of the northerly abutment of said avenue, measuring said latter distance on said easterly side line; thence turning and running northwesterly in a straight line to a point in the easterly side line of said avenue extended northerly, which point is distant 65 feet northerly from the top face of the abutment aforesaid, measuring on said easterly side line so extended. Then beginning again at a point in the westerly side line of said avenue extended northerly, which point is distant 65 feet northerly from the top face of the abutment aforesaid, measuring on said westerly side line so extended; thence running westerly in a straight line to a point which is distant 30 feet northerly from the northwesterly angle of the sea-wall of said corporation as now built; thence turning a little and running still westerly in a straight line parallel to and 30 feet distant northerly from the top face of the northerly sea-wall of said corporation as the same is now authorized to be built, until the said straight line intersects the easterly side line of Elm street extended northeasterly; thence southerly along said line of Elm street to the bulkhead line.

Said pier-head line coincides with the line established by the State in chapter 272 of the acts of 1885.

The pier-head line on the north side of the South Channel is parallel to the bulkhead line and 35 feet outside of it, as established by the State in chapter 19 of the acts of 1859.

Chelsea Side of Mystic River and Chelsea Creek between Chelsea Bridge and Meridian Street Bridge — Pier and Bulkhead Lines.

The pier-head line coincides with the line established by the State in chapter 344 of the acts of 1887, and is as follows: Beginning at a point on the southeasterly side of Chelsea Bridge at the southeasterly corner of the solid portion of said bridge, as now built, at the Chelsea end thereof; thence running southeasterly down Mystic River, making an angle of $73^{\circ} 6'$ taken from a southwesterly to a southeasterly direction with the southerly side of said bridge, and passing through the southwesterly corner of Black's Wharf, 697.57 feet to a point at or near the angle of junction of Chelsea Creek with Mystic River; thence turning $75^{\circ} 58' 11''$ to the east and north and running northeasterly up Chelsea Creek, passing through the southeasterly corners of Gerrish's Wharf and Bisbee's Wharf, 1,496.03 feet to a point on the westerly side of Meridian Street Bridge, marked by an iron plate and copper tack, and distant 23.3 feet southerly from the abutment of said bridge at the Chelsea end thereof.

The bulkhead line is parallel to and 300 feet within the pier-head line.

North side of Mystic River between Chelsea Bridge and Boston and Maine Railroad Bridge — Pier and Bulkhead Lines.

Beginning at a point where a line drawn on the north side of the channel, parallel to and 1,200 feet distant from the bulkhead line on the south side of the channel, intersects the westerly line of the north abutment of Chelsea Bridge, marked M on Boston Harbor Line Board Sheet "J," the pier-head line runs westerly in said parallel line 2,000 feet to a point marked N. Beginning again at a point marked O in said parallel line, at the point of its intersection with the easterly line of Elm street produced across the river, and running westerly in said parallel line 2,475 feet to a point marked P; thence in the arc of a circle curving west and north, and tangent to said line at said point P, with a radius of 1,600 feet, to its intersection with the westerly line of the Malden Bridge abutment; thence northwesterly in a straight line to a point at the mouth of the Malden River marked Q, said point being 710 feet from the easterly side of the Boston and Maine Railroad Bridge, measuring at right angles thereto from a point 570 feet northerly of the south end of the north abutment of said bridge.

The bulkhead line is coincident with the pier-head line between the points M and N. Between Island End and Malden Rivers, the bulkhead line is 600 feet within and parallel to the pier-head line, terminating in Island End River in the northeasterly line of Elm street produced northerly, and in Malden River in the line hereafter described for the left bank of that river.

The harbor lines upon the north side of the river established by the State in chapter 293 of the acts of 1856, and chapter 302 of the acts of 1874, are indicated upon sheet J.

South Side of Mystic River above Boston and Maine Railroad Bridge — Pier and Bulkhead Lines.

Beginning at the northeast corner of the south abutment of the Boston and Maine Railroad Bridge, the bulkhead and pier-head lines are coincident, and follow the north face of said abutment to the west corner thereof; thence run southerly along the westerly face of the said abutment a distance of 700 feet; thence continue northwesterly 1,200 feet on a line which if prolonged would pass through the northeasterly corner of the south abutment of the Middlesex Avenue Bridge; thence, turning westerly through an angle of 135° measured from a southeasterly to a southwesterly direction, continue in a straight line for a distance of 300 feet; thence turning northwesterly continue in a straight line to the northeasterly corner of the south abutment of Middlesex Avenue Bridge; thence along the northerly face of said abutment to the northwest corner thereof; thence, by an angle of 62° with the west face of Middlesex Avenue Bridge, continue northwesterly in a straight line for a distance of 525 feet; thence, by the arc of a circle with a radius of 510 feet tangent thereto, measuring about $64^{\circ} 30'$ from an easterly to

a westerly direction, and by a tangent which extended would strike the southerly line of Mystic avenue at a point 1,420 feet westerly of the southwest corner of Mystic avenue and Taylor street, to a point 250 feet northeasterly from the south side of Mystic avenue, measured along said tangent; thence northwesterly, by a straight line making an angle of 40° with said tangent, to the line of the northerly side of Mystic avenue at a point marked X.

*North side of Mystic River above Boston and Maine Railroad Bridge
— Pier and Bulkhead Lines.*

Beginning at the easterly corner of the north abutment of the Boston and Maine Railroad Bridge, the bulkhead and pier-head lines are coincident, and follow the southerly face of said abutment to the southwest corner thereof; thence the westerly face of the said abutment for a distance of 400 feet; thence northwesterly, by a straight line making an angle of 40° with said line and said abutment, a distance of 450 feet; thence northwesterly, by a straight line which prolonged would strike the easterly side of Middlesex Avenue Bridge at a point 290 feet northerly of the end of the draw opening on the north side, a distance of 1,000 feet; thence northwesterly to a point in the westerly side of Middlesex Avenue Bridge 425 feet distant from the southwesterly end of the draw opening in the north side; thence turning westerly and southerly by the arc of a circle of 1,915 feet radius (the center of said circle being in the west face of Middlesex Avenue Bridge prolonged) through about 45° ; thence southwesterly, by a tangent to said arc which prolonged would strike the southerly side of Mystic Avenue prolonged at a point 1,725 feet westerly of the southwest corner of Mystic avenue and Taylor street, to a point 560 feet from its intersection with the south side of Mystic avenue measured in said tangent; thence, by the arc of a circle turning from a southeasterly to a southwesterly direction and tangent to said last tangent line with a radius of 340 feet, to a line tangent thereto and 275 feet distant from and parallel to Mystic avenue at a point marked Y.

Above the points X and Y the lines are coincident, and follow the meanderings of the river, with a variable distance apart as indicated upon Harbor Line Board Sheet L, to the Medford Street Bridge in the town of Medford.

The State has established no lines on the river above the Boston and Maine Railroad Bridge.

[Approved June 20, 1890.]

III. MALDEN RIVER.

From the Mouth of the River to the Dam in Malden — Pier and Bulkhead Lines.

Beginning at the point Q in the pier-head line on the north side of Mystic River, the pier-head line runs in the arc of a circle of a radius of 600 feet through 69° , turning in a northerly direction; thence by a tangent to this arc to an intersection with the bulkhead line on the north side of Mystic River prolonged northwesterly, which point is marked R.

Beginning again at the southeasterly corner of the north abutment of the Boston and Maine Railroad Bridge, the pier and bulkhead lines are coincident, and follow the easterly side of said bridge abutment a distance of 570 feet; thence in a straight line to a point easterly of and 170 feet distant from the easterly rail of the Boston and Maine Railroad, measured at right angles thereto from a point on said rail 1,010 feet north of the south end of the north abutment of said railroad company's bridge; thence runs more easterly in a straight line to a point 460 feet distant from the easterly rail of the Boston and Maine Railroad, measured at right angles thereto from a point on said rail 1,355 feet north of the south end of the north abutment of said railroad company's bridge; thence runs still more easterly to a point 815 feet distant from the easterly rail of the Boston and Maine Railroad, measured at right angles thereto from a point on said rail 1,615 feet north of the south end of the north abutment of said railroad company's bridge, which point is marked S.

The distance between the points R and S is about 400 feet. Above these points the bulkhead lines follow the meanderings of the river, and converge gradually to a distance apart of 150 feet opposite the switch of the Medford branch of the Boston and Maine Railroad; thence, in a distance of about 600 feet, they approach to 100 feet of each other and preserve this distance apart of 100 feet to a point about 200 feet below the second bridge near the rubber works; thence they converge to a distance apart of 50 feet at said bridge.

Above the points R and S, pile structures may be authorized to extend beyond the bulkhead lines to the line of mean low water.

The State has established no lines for this river.

[Approved June 20, 1890.]

IV. ISLAND END RIVER.

Pier and Bulkhead Lines.

Beginning at the point O in the pier-head line on the north side of Mystic River, the bulkhead line runs northerly in the line of the easterly side of Elm street produced across the Mystic River to its intersection with the bulkhead line at the point marked X on the north side of Mystic River; thence turning easterly by an angle of 10° , measured from a northeasterly to an easterly direction from the line of Elm street produced, it continues straight till it intersects the line of the northeasterly side of Beachem street produced southeasterly at the point marked Y; thence in a straight line to the point marked Z, which point is 500 feet distant from the northwesterly face of the powder magazine on the opposite side of the river, measured in the line of the northeasterly side of the powder magazine wharf.

Beginning again at the point N in the harbor line on the north side of Mystic River, the bulkhead line runs northwesterly at an angle of 125° with the line M N, measured in a northerly and westerly direction, a distance of about 430 feet; thence turning at an angle of 119° , measured from a southeasterly to a northeasterly direction, it continues northeasterly about 625 feet till it intersects a line drawn parallel to the line Y Z on the opposite side of the river, from a point in the northerly side of the powder magazine wharf 100 feet distant from the westerly face of the powder magazine.

Above the powder magazine wharf, the bulkhead lines follow the meanderings of the river, gradually converging to a distance apart of 300 feet just below the fork of the river; thence the lines preserve a distance apart of 200 feet in the main river up to the solid dike, and in the branch a distance apart of 100 feet up to the mill-dam.

The lines thus described are bulkhead lines between which no solid filling shall be hereafter permitted, but pile wharves may be authorized to extend to the mean low water line.

The State has established no lines for this river.

[Approved June 20, 1890.]

V. CHELSEA CREEK.

East Boston side of Chelsea Creek between Meridian Street Bridge and Chelsea Street Bridge — Pier and Bulkhead Lines.

Beginning at the point A of the pier-head line in the westerly face of Meridian Street Bridge, adopted by the Secretary of War July 27, 1889, the pier-head line runs southeasterly to a point 945 feet northerly of Condor street, measured on a line at right angles thereto from a point in the northerly line of said street 840 feet east of its intersection with the easterly line of Meridian street; thence continues southeasterly to the northwest corner of the Glendon Rolling Mills Wharf; thence southeasterly along the face of said wharf to the northeast corner thereof; thence easterly about 460 feet to a point marked H situated 814 feet from the northerly side of Eagle street, measuring northerly and at right angles thereto from a point in said side of said street 460 feet westerly from the intersection therewith of the westerly side of Chelsea street; thence northeasterly about 415 feet to a point marked I situated 685 feet from the westerly side of Chelsea street, measuring northwesterly and at right angles thereto from a point in said side of said street 685 feet northerly from the intersection therewith of the northerly side of Eagle street; thence northeasterly again about 1,015 feet to a point marked K on the west side of Chelsea Street Bridge, said point being 158 feet northerly from the face of the south abutment of said bridge.

This line varies slightly from the line established by the State in chapter 204, acts of 1849, and delineated upon the chart.

The bulkhead line commences at the termination of the bulkhead line in the west face of Meridian Street Bridge, adopted by the Secretary of War, July 27, 1889, and runs northerly to a point in the west face of said Meridian Street Bridge distant 515 feet from the north side of Condor street; thence easterly to a point 500 feet northerly of Condor street, measured on a line at right angles thereto from a point in the northerly line of said street 840 feet east of its intersection with the easterly line of Meridian street; thence continues southeasterly to the intersection of the northerly line of Condor street with the easterly line of Knox street; thence easterly in the line of the northerly side of Condor street produced easterly about 1,038 feet to the westerly face of the East Boston Gas Company's solid wharf; thence northeasterly about 640 feet to a point 275 feet northwesterly of the northwesterly side of Chelsea street, measured on a line at right angles thereto from a point 830 feet northeasterly from the intersection of said side of said street with the northerly side of Eagle street; thence northeasterly about 820 feet to a point 120 feet southeasterly from the face of the south abutment of the Chelsea Street Bridge, measured in the line of the southwesterly face of the bridge; thence to the point K in the pier-head line.

Chelsea side of Chelsea Creek between Meridian Street Bridge and Chelsea Street Bridge — Pier and Bulkhead Lines.

The pier-head line coincides with the line established by the State in chapter 204 of the acts of 1849, with a slight variation near its termination in Meridian Street Bridge, and is as follows:

Commencing at a point on the west side of Chelsea Street Bridge, situated 202 feet southerly from the intersection of the same with the southerly line of Marginal street in the city of Chelsea, said point being marked L on the plan; thence running southwesterly about 955 feet to a point marked M, situate 306 feet from the south line of Marginal street, measuring southerly and at right angles thereto from a point in said side of said street 15 feet easterly from the first bend therein west of Chelsea Street Bridge aforesaid; thence again southwesterly about 317 feet to a point marked N, situate 394 feet from the southerly side of Marginal street, measuring southerly and at right angles thereto from a point in said side of said street 60 feet westerly from the afore-mentioned bend therein; thence westerly about 386 feet to a point marked O, situate 455 feet from the southerly side of Marginal street, measuring southerly and at right angles thereto from a point in said side of said street 440 feet westerly from the afore-mentioned bend therein; thence again westerly about 210 feet to a point marked P, being the southwesterly corner of the Glendon Rolling Mills Company's pier on the Chelsea Flats, situate in the division line of the Winnisimmet Company's water lots numbered 21 and 22, and 465 feet from the southerly side of Marginal street, measuring southerly and at right angles thereto; thence again westerly about 1,330 feet to a point marked Q, situate in the division line between Austin and Carruth's wharves, and 248 feet from the southerly side of Marginal street, measuring southerly and at right angles thereto; thence again westerly about 740 feet to a point marked R, situate in the line of the southerly side of Hawes' Wharf continued, and 300 feet from the southerly side of Marginal street, measuring southerly and at right angles thereto; thence again westerly about 640 feet to a point in the westerly side of Meridian Street Bridge marked by an iron plate and copper tack, and distant 23.3 feet southerly from the abutment of said bridge at the Chelsea end thereof.

The bulkhead line is in rear of the pier-head line, and follows the southeasterly side of Marginal street from Chelsea street to the corner of Pearl and Williams streets.

Chelsea side of Chelsea Creek above Chelsea Street Bridge — Pier and Bulkhead Lines.

Beginning at a point in the easterly side of Eastern avenue, at its intersection with the stone wharf on the southerly side of Bass Creek, the pier-head line follows the northerly face of said stone wharf and its

prolongation easterly for a distance of 560 feet; thence by an arc of a circle of 400 feet radius turning easterly and southerly, and by a tangent to said arc, to the point L of the pier-head line in the westerly face of Chelsea Street Bridge, previously described.

Beginning again at the point in the easterly side of Eastern avenue, above described, the pier-head line follows the easterly side of said avenue northerly a distance of 80 feet; thence turns easterly and runs parallel to the line on the southerly side of Bass Creek till it intersects with the westerly side of Marginal street; thence turning easterly and northerly by the arc of a circle of 530 feet radius and a tangent thereto to a point in the south side of Willoughby street extended easterly 530 feet from the southwest corner of Willoughby and Marginal streets; thence to a point in the north side of Dana street extended easterly 800 feet from the east side of Marginal street; thence to a point in the north side of Bancroft street extended easterly 900 feet from the east side of Marginal street; thence to a point in the south side of Louis street extended easterly 1,100 feet from the east side of Marginal street; thence to a point 580 feet southeasterly from the east side of the abutment of the Eastern Railroad Bridge over Chelsea Creek, measuring in a line perpendicular thereto at a point 50 feet southwest from the northeast corner of said abutment; thence by the arc of a circle of 200 feet radius turning northerly and westerly through an angle of about 141° ; thence in a tangent to said circle to the point 50 feet southwest of the abutment above referred to; thence to the northeast corner of said abutment; thence along the face of the abutment to the northwest corner; thence in a straight line, making an angle of 65 degrees with the western face of said abutment, to the dam of Slade's tide-mill.

Bulkhead Line. — Beginning at the intersection of the south side of Marginal street with the west side of Chelsea Street Bridge, the line follows the southerly side of said Marginal street and its prolongation northeasterly to the easterly side of the Grand Junction Railroad Bridge; thence northeasterly by line parallel to the pier-head line about 970 feet, and by an arc of a circle of 325 feet radius turning westerly to an intersection with the pier-head line on the south side of Bass Creek; thence it is coincident with the pier-head line to and along the easterly side of Eastern avenue and the northerly side of Bass Creek to the west side of Marginal street; thence the bulkhead line turns easterly and northerly by the arc of a circle of 315 feet radius and a tangent thereto to a point in the side of Willoughby street produced easterly, distant 210 feet from the west side of Marginal street; thence by a straight line to the north side of Dana street 470 feet easterly from the east side of Marginal street; thence to a point in the south side of Louis street 615 feet easterly from the east side of Marginal street; thence follows the southerly side of Louis street prolonged to its intersection with the pier-head line; thence the bulkhead line is coincident with the pier-head line to Slade's mill-dam.

Easterly side of Chelsea Creek above Chelsea Street Bridge — Pier and Bulkhead Lines,

Beginning at the point K of the pier-head line in the westerly side of Chelsea Street Bridge, before described, the pier-head and bulkhead lines are coincident, and follow the high-water lines and the westerly side of the railroad embankment and trestle to Slade's mill-dam, as delineated on the chart.

[Approved June 20, 1890.]

VI. SHORE OF EAST BOSTON.

From Jeffrey's Point to Breed's Island — Pier and Bulkhead Lines.

The legal line from the point A near Jeffrey's Point, East Boston, to the point B at Breed's Island, established by section 5, chapter 293, acts of the Commonwealth of Massachusetts of 1856, is recommended for adoption as the pier-head line, beyond which no pile structure shall extend.

Said point A "is in the southwesterly line of Sumner street extended southeastwardly, and 800 feet from the southeasterly line of Jeffrey's street; thence the line runs easterly to a point in the northeasterly line of Everett street continued southeasterly, and distant 1,610 feet from the southeasterly line of Jeffrey's street; thence the line runs northerly to a point in the line of the northeasterly side of Neptune street continued southeastwardly, and distant 1,500 feet from the southeasterly line of Shirley street; thence the line runs straight northeastwardly to the point B on the southwesterly shore of Breed's Island, distant 1,250 feet from the southeasterly line of Saratoga street extended northeastwardly, measuring at right angles therewith from a point distant 1,300 feet from the southwesterly line of Trumbull street."

A parallel line 600 feet in rear thereof is recommended for adoption as the bulkhead line, beyond which no solid filling shall hereafter be permitted.

[Approved June 2, 1890.]

VII. DORCHESTER BAY.

From South Boston to Moon Island.

For Dorchester Bay, between a point C at City Point and a point Y on Neponset River, the pier-head lines coincide with the lines now fixed by the laws of Massachusetts in chapters 293 of the acts of 1856, 351 of the acts of 1872, and 332 of the acts of 1873.

On the right bank of the Neponset, between the Neponset Avenue Bridge and the mouth, the pier-head line recommended follows the line established by the State in its general features, but modified to give a gradual increase of width to the water-way near the mouth, in accordance with the best modern practice in the case of tidal streams.

Between the mouth of the Neponset River and the sewerage outlet on Moon Island, the State has never defined harbor lines. This has been done by the Board, after several public meetings and full consultation with the riparian proprietors, in a manner which it is believed will protect the general interests of the harbor and serve the local needs of the district in question.

The lines which are recommended for adoption are defined as follows :

1. Pier-Head Lines.

The pier-head line commences at a point marked C, which is in the westerly line of P street, South Boston, extended southwardly, and 530 feet from the southerly line of Sixth street; thence southwestwardly again to the point D in the easterly line of M street extended southwardly, and 1,300 feet from the southerly line of Eighth street; thence westwardly, parallel with Eighth street, to the point E in the easterly line of Old Harbor street extended southwardly; thence southwardly 1,400 feet to the point F in the easterly line of Old Harbor street extended southwardly; thence eastwardly, making an angle of 104° (taken from a northerly to an easterly direction) with the line last described, to the point G in the easterly line of M street extended southwardly; thence 3,200 feet to the point H in the easterly line of M street extended southwardly; thence southwestwardly 2,320 feet, making an angle of 124° (taken from a northeastwardly to a southwestwardly direction) with the line last described, to a point marked X'; thence continuing 1,900 feet westwardly a little more southwardly, making an angle of $5^{\circ} 15'$ with the line last described extended, to the point marked I²; thence westwardly in a straight line which, extended, would strike the east side of the embankment of the Old Colony Railroad 515 feet northwardly from the north side of the present

water-way through said embankment, to a point 500 feet eastwardly from the east side of said embankment, marked J²; thence southwardly 590 feet parallel to the east side of said embankment to a point marked K²; thence southeastwardly in a straight line to the point marked L, which is distant 200 feet from the northeasterly corner of Ranstead, Dearborn & Company's Wharf (as built in 1856), measuring at right angles with the northeasterly end of said wharf; thence southwardly to the point M, distant 1,350 feet from the northeasterly rail of the Old Colony Railroad, measuring at right angles therewith from a point distant 4,000 feet northwestwardly from the draw in its bridge over Neponset River; thence southeastwardly to the point N, distant 1,200 feet from said rail, measuring at right angles therewith from a point distant 3,300 feet northwestwardly from said draw; thence southeasterly to the point O, which is distant 1,460 feet from the said rail, measuring at right angles therewith from a point distant 2,670 feet northwestwardly from the said draw; thence southeastwardly again to the point P, distant 1,630 feet from said rail, measuring at right angles therewith from a point distant 2,150 feet northwestwardly from said draw; thence southeastwardly again to the point Q, distant 1,700 feet northeastwardly from said rail, measuring at right angles therewith from a point distant 1,600 feet northwestwardly from said draw; thence southeastwardly again to the point R, distant 1,590 feet northeastwardly from said rail, measuring at right angles therewith from a point 1,090 feet northwestwardly from said draw; thence southeastwardly to the point S, distant 1,340 feet northeastwardly from said rail, measuring at right angles therewith from a point distant 630 feet northwestwardly from said draw; thence southerly to the point T, distant 1,140 feet northeastwardly from said rail, measuring at right angles therewith from a point distant 380 feet northwestwardly from said draw; thence southwestwardly to the point U, distant 850 feet northeastwardly from said rail, measuring at right angles therewith from a point distant 270 feet northwestwardly from said draw; thence southwestwardly again to the point W on the southeastwardly corner of James Jenkins's Wharf, formerly so called; thence southwestwardly again to the point X on the southeasterly corner of W. R. Chamberlin's Wharf, formerly so called; thence continuing southwestwardly, along the southeastwardly ends of said Chamberlin's Wharf and of Edward Preston's Wharf, formerly so called, to the point Y on the eastwardly side of the Neponset Bridge.

On the easterly side of Neponset River, the line begins at the point A' on the easterly side of the Neponset Bridge, and 400 feet southerly from the point Y on the west side of the river; thence in a straight line to the point B' on the northeasterly side of the Old Colony Railroad Bridge, distant 400 feet southeastwardly from the line W X on the opposite side of the river between the points W and X, measuring at right angles from said line; thence northeastwardly, parallel to the line W U on the opposite side of the river, to the point C', distant 400 feet southeastwardly from the point U, measuring at right angles to the line W U; thence northeastwardly again to the point D', distant 450 feet

southeastwardly from the opposite point T, measuring on a line bisecting the angle at said point T; thence northwardly to the point E', distant 450 feet eastwardly from the opposite point S, measuring on a line bisecting the angle at said point S; thence north a little westerly to the point F', distant 450 feet eastwardly from the opposite point R, measuring on a line bisecting the angle at said point R; thence northerly a little more westerly to the point G', distant 500 feet easterly from the opposite point Q, measuring on a line bisecting the angle at said point Q; thence northwesterly to the point H', distant 650 feet northeasterly from the opposite point P, measuring on a line bisecting the angle at said point P; thence northwesterly to the point I', distant 700 feet northeasterly from the opposite point O, measuring on a line bisecting the angle at O; thence northwesterly to the point J', distant 900 feet northeasterly from the opposite point N, measuring on a line bisecting the angle at N; thence northwesterly to the point K', distant 900 feet easterly from the point M, measuring on a line bisecting the angle at M; thence northeasterly to the point L', distant 1,000 feet from the point L on the west side of the river, measuring on a line perpendicular at L to the line L M; thence to the point M', which is in the easterly side of M street, South Boston, prolonged southwardly 3,150 feet from the point H near the west shaft of the sewer tunnel; thence due east to the point N', which is 3,000 feet due west from Squantum Coast Survey Point; thence easterly to the point O', which is 500 feet due north from Squantum Coast Survey Point; thence due east 4,000 feet to the point P'; thence to the north corner of the sewerage outlet at Moon Head.

2. Bulkhead Lines.

The bulkhead line is coincident with the pier-head line from the point C to the point F.

From F it runs southwardly in a straight line to the point I, which is on the line which bisects the angle at G of the pier-head line and 600 feet west of the line G H of the pier-head line; thence, parallel to the pier-head line G H and 600 feet within it, to a point on the line bisecting the angle at H of the pier-head line; thence parallel to the pier-head line H X' for a distance of 1,300 feet; thence turning by an angle of 105° , measuring from an easterly to a northerly direction, and running 2,000 feet; thence turning by an angle of 105° , measuring from a southerly to a westerly direction, and running 600 feet; thence turning by an angle of 86° , measuring from an easterly to a southerly direction, and running 1,965 feet; thence turning an angle of $91^{\circ} 15'$, measuring from a northerly to a westerly direction, and running 1,600 feet to a point marked II, which is at the intersection of two lines, one a line parallel to the pier-head line X¹ I² and 600 feet within it, and the other parallel to the pier-head line I² J² and 400 feet within it; thence parallel to the line I² J² and 400 feet from it inland, to the easterly side of the Old Colony Railroad embankment; thence along the easterly side of said embankment to a point 160 feet southward of the draw-opening; thence eastwardly, parallel to K² L of the pier-head line, to the point III.

The point III is in the line last described (parallel to $K^2 L$) at its intersection with the north face of the Boston Gas Company's Wharf prolonged 920 feet westerly from the northeastern corner of said wharf; thence the line follows the faces of said wharf to an intersection with the pier-head line $L M$ 250 feet southerly from L ; thence the bulkhead and pier-head lines are coincident to the point IV, which is 1,000 feet southward from the point L ; thence in a straight line parallel to South Street, and 200 feet from the south side of said street, to a point on the eastern side of Commercial Street Bridge; thence along the east side of Commercial Street Bridge 750 feet; thence to the point V, which is distant 900 feet northeastwardly from the northeastern rail of the Old Colony Railroad, measuring at right angles therewith from a point distant 3,300 feet northwestwardly from the draw in the bridge over the Neponset River; thence to the point VI, which is distant 1,350 feet northeastwardly from said rail, measuring at right angles therewith from a point distant 2,150 feet northwestwardly from said draw; thence to a point distant 1,400 feet northeastwardly from said rail, measuring at right angles therewith from a point distant 1,600 feet from said draw; thence to a point distant 1,250 feet northeasterly from said rail, measuring at right angles therewith from a point distant 1,090 feet northwesterly from said draw; thence to the northeast corner of the sea-wall of Stearns' lumber wharf: thence to a point 155 feet northwesterly from the point W of the pier-head line, measuring along the northeastern face of said wharf; thence the bulkhead line is parallel to and 155 feet distant from the pier-head lines, to the city highway bridge over Neponset River.

On the easterly side of Neponset River, the bulkhead line starts at a point on the east side of the highway bridge over Neponset River 750 feet southeast from the point Y , measuring along the east side of said bridge, and runs in a straight line to a point in the east side of the Old Colony Railroad Bridge 350 feet southeastward from the point B' of the pier-head line, measuring along the east side of said bridge; thence to the point VII, which is 350 feet distant from the point C' of the pier-head line, measuring on a perpendicular to the pier-head line $B' C'$ at C' ; thence to the point VIII, which is 350 feet distant from the point D' of the pier-head line, measuring on a perpendicular to the pier-head line $C' D'$ at D' ; thence to the point IX, which is in the pier-head line $B' C'$ extended eastwardly 1,050 feet from C' ; thence to the point X, which is distant 2,420 feet from the northeasterly rail of the Old Colony Railroad, measuring perpendicular thereto from a point 1,090 feet from the draw in the bridge over the Neponset River; thence to the point XI, which is distant 2,775 feet northeasterly from said rail, measuring at right angles therewith from a point distant 3,300 feet from said draw; thence the bulkhead line is parallel to the pier-head line, and 600 feet within it, to the point XII, which is at its intersection with the foot of the outfall sewerage embankment, near point P' of the pier-head line; thence along said foot of the embankment to the north corner of the sewerage outlet, where the bulkhead and pier-head lines meet.

[B.]

[See page 14 of this Report, *ante*.]

SECTIONS 4 TO 12 OF THE RIVER AND HARBOR ACT OF SEPTEMBER 19, 1890, RELATING TO BRIDGES AND OTHER OBSTRUCTIONS IN NAVIGABLE WATERS, TO HARBOR LINES, ETC.

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, * * * **

SECTION 4. That section nine of the river and harbor act of August eleventh, eighteen hundred and eighty-eight, be amended and reenacted so as to read as follows :

That whenever the Secretary of War shall have good reason to believe that any railroad or other bridge now constructed, or which may hereafter be constructed, over any of the navigable water-ways of the United States, is an unreasonable obstruction to the free navigation of such waters on account of insufficient height, width of span, or otherwise, or where there is difficulty in passing the draw-opening or the draw-span of such bridge by rafts, steam boats, or other water-craft, it shall be the duty of the said Secretary, first giving the parties reasonable opportunity to be heard, to give notice to the persons or corporations owning or controlling such bridge so to alter the same as to render navigation through or under it reasonably free, easy, and unobstructed ; and in giving such notice he shall specify the changes required to be made, and shall prescribe in each case a reasonable time in which to make them. If at the end of such time the alteration has not been made, the Secretary of War shall forthwith notify the United States district attorney for the district in which such bridge is situated, to the end that the criminal proceedings mentioned in the succeeding section may be taken.

SECTION 5. That section ten of the river and harbor act of August eleventh, eighteen hundred and eighty-eight, be amended and reenacted so as to read as follows :

That if the persons, corporation, or association owning or controlling any railroad or other bridge, shall, after receiving notice to that effect as herein before required from the Secretary of War and within the time prescribed by him, willfully fail or refuse to remove the same, or to comply with the lawful order of the Secretary of War in the premises, such persons, corporation or asso-

ciation shall be deemed guilty of a misdemeanor, and, on conviction thereof, shall be punished by a fine not exceeding five thousand dollars; and every month such persons, corporation, or association shall remain in default in respect to the removal or alteration of such bridge shall be deemed a new offense, and subject the persons, corporation, or association so offending to the penalties above prescribed.

SECTION 6. That it shall not be lawful to cast, throw, empty, or unlade, or cause, suffer, or procure to be cast, thrown, emptied, or unladen, either from or out of any ship, vessel, lighter, barge, boat, or other craft, or from the shore, pier, wharf, furnace, manufacturing establishments, or mills of any kind whatever, any ballast, stone, slate, gravel, earth, rubbish, wreck, filth, slabs, edgings, sawdust, slag, cinders, ashes, refuse, or other waste of any kind, into any port, road, roadstead, harbor, haven, navigable river, or navigable waters of the United States, which shall tend to impede or obstruct navigation; or to deposit or place, or cause, suffer, or procure to be deposited or placed, any ballast, stone, slate, gravel, earth, rubbish, wreck, filth, slabs, edgings, sawdust, or other waste, in any place or situation on the bank of any navigable waters where the same shall be liable to be washed into such navigable waters, either by ordinary or high tides, or by storms or floods, or otherwise, whereby navigation shall or may be impeded or obstructed: *Provided*, That nothing herein contained shall extend or be construed to extend to the casting out, unloading, or throwing out of any ship or vessel, lighter, barge, boat, or other craft, any stones, rocks, bricks, lime, or other materials used, or to be used, in or toward the building, repairing, or keeping in repair any quay, pier, wharf, weir, bridge, building, or other work lawfully erected or to be erected on the banks or sides of any port, harbor, haven, channel, or navigable river; or to the casting out, unloading, or depositing of any material excavated for the improvement of navigable waters, into such places and in such manner as may be deemed by the United States officer supervising said improvement most judicious and practicable and for the best interests of such improvements; or to prevent the depositing of any substance above mentioned under a permit from the Secretary of War, which he is hereby authorized to grant, in any place designated by him where navigation will not be obstructed thereby.

SECTION 7. That it shall not be lawful to build any wharf, pier, dolphin, boom, dam, weir, breakwater, bulkhead, jetty, or structure of any kind, outside established harbor lines, or in any navigable waters of the United States where no harbor lines are or

may be established, without the permission of the Secretary of War, in any port, roadstead, haven, harbor, navigable river, or other waters of the United States, in such manner as shall obstruct or impair navigation, commerce, or anchorage of said waters ; and it shall not be lawful hereafter to commence the construction of any bridge, bridge-draw, bridge piers and abutments, causeway or other works, over or in any port, road, roadstead, haven, harbor, navigable river, or navigable waters of the United States, under any act of the legislative assembly of any State, until the location and plan of such bridge or other works have been submitted to and approved by the Secretary of War ; or to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of the channel of said navigable water of the United States, unless approved and authorized by the Secretary of War : *Provided*, That this section shall not apply to any bridge, bridge-draw, bridge piers and abutments the construction of which has been heretofore duly authorized by law, or be so construed as to authorize the construction of any bridge, draw bridge, bridge piers and abutments, or other works, under an act of the legislature of any State, over or in any stream, port, roadstead, haven or harbor, or other navigable water not wholly within the limits of such State.

SECTION 8. That all wrecks of vessels and other obstructions to the navigation of any port, roadstead, harbor, or navigable river, or other navigable waters of the United States, which may have been permitted by the owners thereof or the parties by whom they were caused, to remain to the injury of commerce and navigation for a longer period than two months, shall be subject to be broken up and removed by the Secretary of War, without liability for any damage to the owners of the same.

SECTION 9. That it shall not be lawful for any person or persons to take possession of or make use for any exclusive purpose, or build upon, alter, deface, destroy, injure, obstruct, or in any other manner impair the usefulness of any sea-wall, bulkhead, jetty, dike, levee, wharf, pier, or other work built by the United States in whole or in part, for the preservation and improvement of any of its navigable waters, or to prevent floods, or as boundary marks, tide-gauges, surveying-stations, buoys, or other established marks ; nor remove for ballast or other purposes any stone or other material composing such works.

SECTION 10. That the creation of any obstruction, not affirmatively authorized by law, to the navigable capacity of any waters in respect of which the United States has jurisdiction, is hereby prohibited. The continuance of any such obstruction, except

bridges, piers, docks and wharves, and similar structures erected for business purposes, whether heretofore or hereafter created, shall constitute an offense; and each week's continuance of any such obstruction shall be deemed a separate offense. Every person and every corporation which shall be guilty of creating or continuing any such unlawful obstruction in this act mentioned, or who shall violate the provisions of the last four preceding sections of this act, shall be deemed guilty of a misdemeanor, and, on conviction thereof, shall be punished by a fine not exceeding five thousand dollars, or by imprisonment (in the case of a natural person) not exceeding one year, or by both such punishments, in the discretion of the court. The creating or continuing of any unlawful obstruction in this act mentioned may be prevented, and such obstruction may be caused to be removed, by the injunction of any circuit court exercising jurisdiction in any district in which such obstruction may be threatened or may exist; and proper proceedings in equity to this end may be instituted under the direction of the attorney-general of the United States.

SECTION 11. That it shall be the duty of officers and agents having the supervision, on the part of the United States, of the works in progress for the preservation and improvement of said navigable waters, and, in their absence, of the United States collectors of customs and other revenue officers, to enforce the provisions of this act by giving information to the district attorney of the United States for the district in which any violation of any provision of this act shall have been committed: *Provided*, That the provisions of this act shall not apply to Torch Lake, Houghton County, Michigan.

SECTION 12. That section twelve of the river and harbor act of August eleventh, eighteen hundred and eighty-eight, be amended and re-enacted so as to read as follows:

Where it is made manifest to the Secretary of War that the establishment of harbor lines is essential to the preservation and protection of harbors, he may, and is hereby authorized, to cause such lines to be established, beyond which no piers, wharves, bulk-heads or other works shall be extended or deposits made, except under such regulations as may be prescribed from time to time by him; and any person who shall willfully violate the provisions of this section, or any rule or regulation made by the Secretary of War in pursuance of this section, shall be deemed guilty of a misdemeanor, and, on conviction thereof, shall be punished by a fine not exceeding one thousand dollars, or imprisonment not exceeding one year, at the discretion of the court, for each offense.

[C.]

[See page 7 of this Report, *ante*.]

ARTICLES OF AGREEMENT, MADE THIS TWENTY-FIFTH DAY OF SEPTEMBER, IN THE YEAR EIGHTEEN HUNDRED AND NINETY, BY AND BETWEEN THE COMMONWEALTH OF MASSACHUSETTS, ACTING BY ITS BOARD OF HARBOR AND LAND COMMISSIONERS, PARTY OF THE FIRST PART, AND THE NEW ENGLAND DREDGING COMPANY, A CORPORATION DULY ESTABLISHED UNDER THE LAWS OF SAID COMMONWEALTH, PARTY OF THE SECOND PART.

The said party of the second part hereby covenants and agrees with the said party of the first part, to do and complete all the work specified and described in the following specifications for widening a channel on South Boston flats, all of said work to be done and completed in the manner, and in accordance with and subject to the terms and conditions, in said specifications set forth: —

Specifications.

The party of the second part is to furnish all the plant, tools, appliances and labor necessary to widen, by dredging, a channel about 5,400 feet long on South Boston flats.

The location and dimensions of the channel, and the widening required, are more exactly shown on a plan on file in the office of the Board of Harbor and Land Commissioners, entitled “Plan for widening channel on South Boston flats, September, 1890. Scale 2400.” Said plan is referred to and made a part of these specifications.

The channel is to be widened, on its southeasterly side, so as to have the following dimensions, — that is to say, so as to be, after

the work is completed, 12 feet deep at mean low water and 110 feet wide on the bottom, with slopes 2 to 1 on each side, for a distance of 4,100 feet from its westerly end, and the remainder of the distance 8 feet deep at mean low water and 115 feet wide on the bottom, with slopes 2 to 1 on each side.

The amount of material to be removed to widen the channel as above described, is about 69,000 cubic yards.

The least present depth of water on the above area is 0.9 feet at mean low water, and the average depth is about 3 feet.

The whole channel to have throughout, when the work is completed, the depth of water, width and side slopes described above and shown on said Plan; but no dredging to be required in that part of the channel already excavated to the depths above specified, except to remove such material as may be forced or dropped into it in the work of widening.

No extra payment or allowance to be made for any excavation below the required depth or outside the prescribed limits of the channel.

All ledges and bowlders and other obstructions which may be found, and which can be removed by dredging, to be removed as part of the contract without extra payment or allowance; but if any ledges or bowlders are found which cannot be removed by dredging, the covering material to be dredged away, and the ledges and bowlders left bare to the depth aforesaid; and the Engineer of said Board to be the sole judge to determine whether any ledge or bowlder can be removed by dredging or not.

All of the material dredged to be deposited on the South Boston flats, at such places on said flats as may from time to time be directed by said Engineer; and all dumping of such material to be done within one hour and one-half before or after high water. If dumped at the elevating station of the New England Dredging Company, the rules established by said company to govern such dumping, and the instructions of its authorized agent in charge of said station to be observed and followed.

The said party of the second part to fill, with part of the material excavated, the trench in rear of the sea-wall on the northerly side of the reserved channel on said flats, to as high a grade as practicable, and to furnish suitable scows or other appliances for doing this to the best advantage, and to the satisfaction of said Engineer.

The aforesaid Plan, and the surveys and calculations based thereon, are believed to be correct; but said party of the second part must examine for itself, as no allowance will be made for any errors or inaccuracies which may be found therein.

In all questions which may arise concerning measurements, lines and grades, the decision of said Engineer to be final.

All necessary aid and materials for giving or indicating lines and grades, to be furnished by said party of the second part at its own expense; and convenient facilities for the inspection of the work to be furnished whenever requested.

All instructions and directions of said Engineer to be strictly observed and followed.

All of the work to be done to the satisfaction of said Engineer, and with such machinery and appliances, and by such methods, as shall be approved by him, and to the acceptance of said Board.

The work to be commenced at once, and to be prosecuted vigorously in all suitable weather until completion; and to be fully completed on or before the thirty-first day of December, 1890.

Estimates to be made by said Engineer of the amount of work done up to the end of each calendar month, and payment to be made thereon of 75 per centum of the proportional part of the whole contract price applicable to such work, as computed by said Engineer; and the remaining 25 per centum to be paid upon the final completion and acceptance of the whole work.

If said party of the second part refuses or neglects to prosecute the work, or in any other respect fails to carry out the provisions of the contract, said Board may annul the same, and contract anew with other parties, without prejudice to its claim for damages arising from breach thereof.

The word "Engineer," as used herein, means the Engineer of said Board of Harbor and Land Commissioners, or his authorized assistant in immediate charge of the work.

And the said party of the first part, in consideration of the performance and completion of all of said work in the manner and in accordance with the terms and conditions aforesaid, hereby covenants and agrees to pay the said party of the second part the sum of nine thousand nine hundred and fifty dollars (\$9,950), said sum to be in full therefor, and to be paid at the times, and in the manner, and upon the terms and conditions, set forth in the foregoing specifications.

IN WITNESS WHEREOF, on the day and year first above written, the said Commonwealth of Massachusetts, acting by its said Board of Harbor and Land Commissioners, has caused these presents to be signed and delivered in its name and behalf, and the seal of the Commonwealth to be hereunto affixed, and has also caused these presents to be approved by its Governor and Council; and the said New England Dredging Company, by Charles H. Souther,

its president and treasurer, thereunto duly authorized, has caused these presents to be signed and delivered in its name and behalf, and its corporate seal to be hereunto affixed.

THE COMMONWEALTH OF MASSACHUSETTS,

By JOHN E. SANFORD, }
JOHN I. BAKER, } *Harbor and Land*
CHAS. H. HOWLAND, } *Commissioners.*

NEW ENGLAND DREDGING COMPANY,

By CHARLES H. SOUTHER, [SEAL OF THE NEW ENGLAND
DREDGING CO.]
President and Treasurer.

In Council, October 1, 1890. Approved.

Witness the Seal of the Commonwealth. [SEAL OF THE
COMMONWEALTH.]

HENRY B. PEIRCE, *Secretary.*

[D.]

[See page 39 of this Report, *ante*.]

LEASE OF HANGMAN'S ISLAND.

THIS INDENTURE, made this first day of January, in the year eighteen hundred and ninety, between the Commonwealth of Massachusetts, acting by its Board of Harbor and Land Commissioners, and S. Albert Freeman, of Boston, in the County of Suffolk and Commonwealth aforesaid,

WITNESSETH, that the said Commonwealth doth hereby lease unto the said S. Albert Freeman, that tract of land in Boston Harbor known as Hangman's Island, to hold for the term of three years from the date hereof, in trust, nevertheless, for the uses and purposes, and upon the terms and conditions, hereinafter set forth, that is to say ;

That, Whereas, said island is now occupied by Lawrence Hogan, Owen Hogan, Nathan S. Brown, James E. Hassett, William E. Greenfield, John R. Putnam, James Powers, Joseph Powers, and Thomas McKinley, fishermen, as a fishing station ; and whereas said S. Albert Freeman, although not a fisherman, is the owner and interested in the ownership of certain personal property situated on said island, and used by said fishermen in the prosecution of their said business ;

Now, therefore, the said S. Albert Freeman, trustee as aforesaid, is to hold said leased premises in trust for himself and the above named Lawrence and Owen Hogan, Nathan S. Brown, James E. Hassett, William E. Greenfield, John R. Putnam, James and Joseph Powers, and Thomas McKinley, and all of said persons are to have the same and equal privileges upon said island and in the occupancy thereof ; and the use and occupancy thereof shall, during said term, be and continue substantially the same as heretofore, and all of the persons aforesaid shall have

and enjoy an equal share in the control and management of said premises, and shall contribute to said Freeman in equal proportions the rental thereof, which is to be paid as hereinafter set forth.

And it is expressly provided as one of the terms and conditions of this lease and of occupancy under the same, that no intoxicating liquors of any kind shall be stored, kept or sold on said island; and it is further understood that in case any person named as beneficiary herein shall for the space of one year neglect or refuse, upon demand in writing by said Freeman, to pay to said Freeman his proportion of the rental herein specified, then and in that case his rights herein shall terminate and cease; and in case said Freeman shall neglect to pay promptly to the Commonwealth the rent herein reserved, such neglect shall be and operate as a resignation of said trust and as a surrender of all his interest herein, and such other person may be designated as trustee hereunder as may be in writing agreed upon by the parties hereto. But nothing herein contained shall be construed to excuse said trustee from the prompt payment of the rent herein reserved at the time the same becomes due as herein set forth, or to prevent a forfeiture of this lease in case of non-payment of rent.

And the said Freeman, trustee as aforesaid, agrees to pay to said Commonwealth the sum of fifty dollars as rent for each and every year during the term hereof, the same to be payable on the first day of July annually, and not to lease or underlet the premises or any part thereof, and not to sell or assign this lease; and at the end of said term to quit and deliver up to said lessor or its agents or servants, said premises peaceably and quietly. And it is expressly understood that no alteration in the shores or surface of said island shall be made, and no structure built below high water mark, without the written consent and license of the Board of Harbor and Land Commissioners; and that all persons in danger by perils of the sea, or from stress of weather, or otherwise, shall have full and free right to land upon said island. And said Board of Harbor and Land Commissioners, and such other servants and agents of the Commonwealth as may be designated for that purpose, may at all times enter upon any part of said premises, and may at any time expel said lessee and any other persons claiming under this lease, if he or they shall fail to pay the rent as aforesaid, or shall fail to keep any of the terms and conditions of this lease.

In witness whereof, the said Commonwealth, acting by its Board of Harbor and Land Commissioners, has caused these presents to be executed in its name and behalf, and to be approved

by its Governor and Council, and its seal to be hereto affixed; and the said S. Albert Freeman, trustee as aforesaid, has here unto set his hand and seal, the year and day first above written.

THE COMMONWEALTH OF MASSACHUSETTS,

By JOHN E. SANFORD, } *Harbor and*
JOHN I. BAKER, } *Land*
CHAS. H. HOWLAND, } *Commissioners.*

S. ALBERT FREEMAN.

[SEAL.]

Witness, JOHN A. NOONAN to S. A. F.

In Council, March 19, 1890. Approved.

Witness the Seal of the Commonwealth.

[SEAL OF THE
COMMONWEALTH.]

HENRY B. PEIRCE,

Secretary of the Commonwealth.

